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AMERICAN GAS LIGHT JOURNAL

FIFTY-EIGHTH YEAR

VOLUME CV., No. 15. Whole No. 3067. | NEW YORK, MONDAY, OCTOBER 9, 1916. | Subscription, $3 Per Year. $4 Canada. $5 Foreign.

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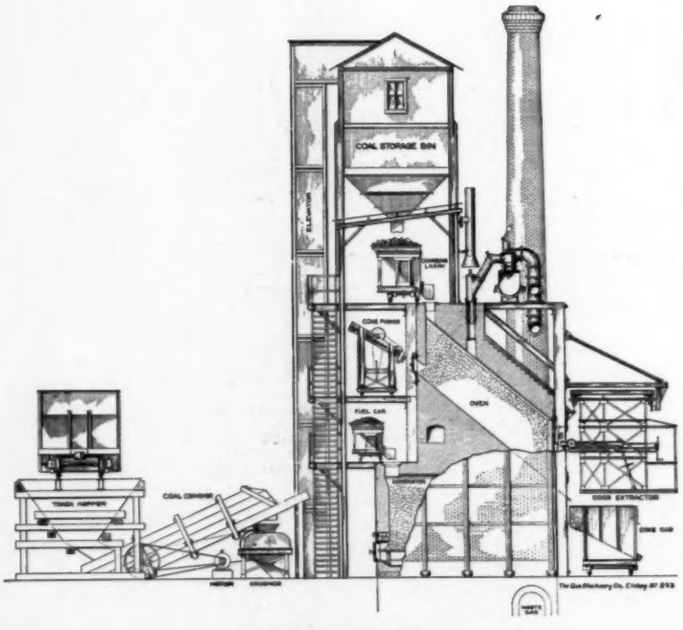

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1859 FIFTY-EIGHTH YEAR 1916

AMERICAN

GAS LIGHT JOURNAL

VOL. CV., No. 15. NEW YORK, OCTOBER 9, 1916 WHOLE No. 3,057.

Three Principal Difficulties Presented in the Use of the Surface Combustion Principle for the Gas Firing of Boilers

Where Radio Heat is Used in Boilers the Steam Space must be Materially Increased—Radiant Heat Most Effective Where Least Obstructed—Original Work Along Lines of Surface Combustion Diametrically Opposed to Basic Conception of Radio Activity

By NISBET LATTA

Author of American Gas Practice and American Producer Gas and Combustion Engineering

There are three chief difficulties in the use of surface combustion for the gas firing of boilers. First, the molecular strain caused by the intense radiant heat upon the metal tubes themselves. Second, the localization of heat, and third, the fact that the rate of heat transfer in this radiant form is as the fourth power of the absolute temperature.

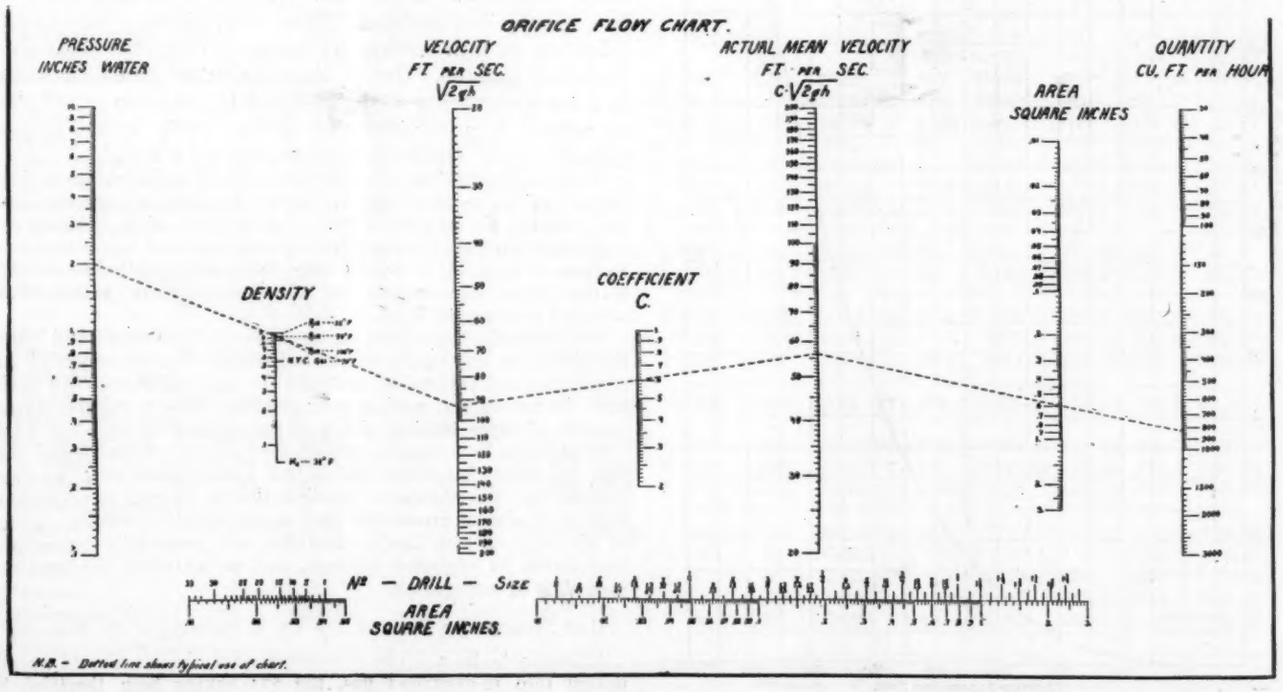
There is a tendency toward priming, due to the formation of steam bubbles on the inside of the tube. This may be obviated to a certain degree by inclining the tubes at an angle not less than 45 degrees, but the practicability of this arrangement is doubtful, and it is likely that if this form of boiler furnace is ever adopted it will be confined to the vertical rather than the horizontal type of boiler. The efficiency of this furnace, however, is extremely high, running 93 per cent to 95 per cent as against, roughly speaking, 65 per cent in ordinary practice.

Steam Space Must Be Materially Increased When Radio Heat is Applied to Boilers

Where radio heat is used in the boilers, it must also be noted that the steam space must be materially increased and should be, if possible, double that under ordinary conditions of fire. If these methods can be worked out the wide range and sympathetic control of radiant heat are specially applicable to boilers possessing a variable load.

Returning again to the general subject of furnaces and including the boiler heating, we must consider that heat may be roughly divided into three classes,—radiant, conducted and convected,—the first two having been described in an article by the writer in a previous issue of this journal, and the second being the heat transmitted by both radiation and contact of fluid elements.

Concerning the first it is the belief of the writer that the


ORIFICE FLOW CHART.
PRESSURE INCHES WATER
VELOCITY FT. PER SEC. $\sqrt{2gh}$
ACTUAL MEAN VELOCITY FT. PER SEC. $C\sqrt{2gh}$
QUANTITY CU. FT. PER HOUR
AREA SQUARE INCHES
DENSITY
COEFFICIENT C.
Nº — DRILL — SIZE
AREA SQUARE INCHES.
N.B. — Dotted line shows typical use of chart.

original work along the lines of surface combustion was diametrically opposed to the basic conception of radio activity.

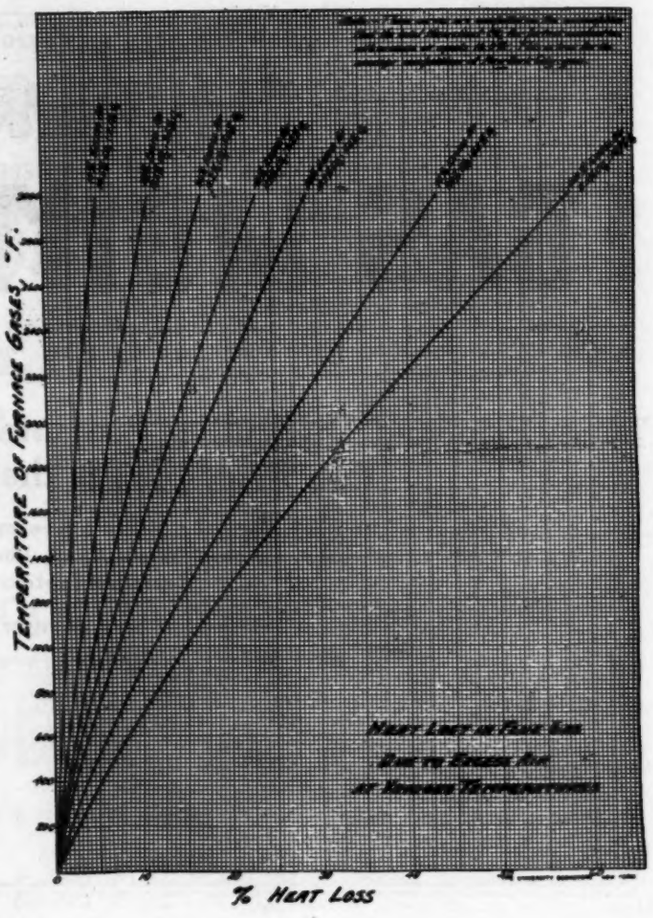
Radiant heat is most effective where least obstructed, and where there is a maximum possibility of direct impulse, reflection, refraction and reverberation.

This law being conceded, it is obvious that in filling up a large portion of the furnace with large quantities of baffling material as in the original types of the furnace named, large quantities of refractory material through which the heat waves as well as the gases themselves must pass, is not an original projection. and such an arrangement is prejudicial to the prerequisites of the process desired.

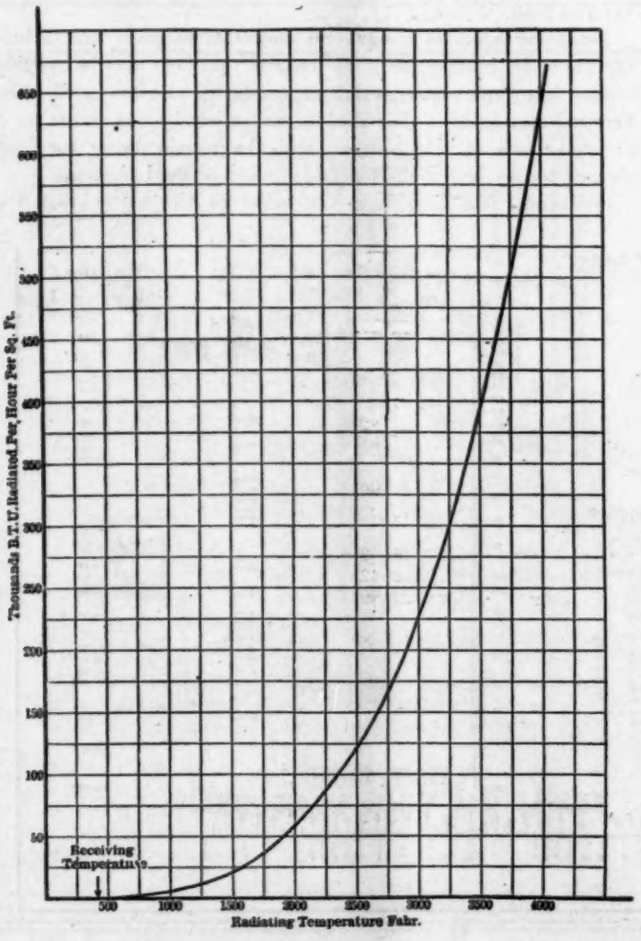
Use of Lining Burners Would Be Most Efficient Method

It is therefore evident that the use of lining burners or walls, which in themselves constitute burners, so placed as to get the maximum of reverberatory effect with a minimum of ineffective impingement would prove the more efficient method, especially in furnaces with any considerable rapidity of charge and discharge, as the loss of stored heat in these baffles or the mass of refractory material described is proportionally great.

In the use of these linings or burner heads rapid progress has been made for the burner head under high temperatures. Carborundum is probably the most satisfactory material, possessing, as it does, a porosity, when properly constructed, of 40 per cent, and being susceptible of drilling with $\frac{1}{32}$ or $\frac{1}{16}$ in. hole (Dr. Lucke recommends $\frac{1}{16}$ in. burner holes for domestic appliances). These heads or plates may be superimposed, if necessary, upon a sub-lining of magnesite or silica brick or tile



RADIANT HEAT TRANSMISSION RATES



In addition to the porosity of carborundum, 40% Refrax, say 12 x 1 in. may be perforated with small holes, $\frac{1}{16}$ or $\frac{1}{32}$ in. in diameter at intervals of $\frac{3}{8}$ to $\frac{1}{2}$ in. apart, without seriously jeopardizing the structural strength of the plate. The difficulty with carborundum is the fact that it is an extremely efficient conductor of heat and must therefore be supplemented by a material of lower conduction. Several new types of bricks and insulators have recently been perfected. These, although not extraordinarily refractory in their nature, are extraordinarily efficient in their insulating qualities. One of these claims an insulating ability in a furnace or boiler setting of 9 to 1-in. reduction of radiation as referred to a non-insulating setting. This is due, unquestionably, to the cellular characteristics of the material.

There are conditions of combustion which do not seem to lend themselves to radiant heat or highly localized temperature; as, for instance, the manufacture of gypsum, lime, brick burning and such industrial appliances as the recently devised fan blown confectioners' oven. It is possible that furnaces might be constructed to meet these requirements, but it is doubtful if it could be done upon an economical basis.

In the application of gas for operations of this kind, and where the liquid or impinging flame is desirable, the principles of intermixture and infiltration are none the less important. We again have the necessity of mechanically or otherwise securing the nearest possible of vapor tension, either in the physical or chemical form.

It seems to be a common principle in gas, oil, or pulverized fuel that the disruption of the fuel is best accomplished in a two-stage process, and it seems also a principle that to prevent re-agglomeration, it is wise to areate the fuel or interpolate a certain amount of air even in very small quantities, not necessarily to reach a combustive or explosive mixture, but to maintain the particles in a state of segregation.

Gas Should Be Broken Up By a Plurality of Nozzles

It seems to be a further principle that the air should be admitted into re-expanded gas, the gas having been throttled by

being passed through a throat of the Venturi type. The infiltration of air at the point of this re-expansion seems to be infinitely more complete. In other words, it appears highly desirable that the gas, whether burned as a Bunsen mixture or not, should be broken up by a plurality of nozzles reduced and re-expanded permeably with a certain amount of air in the mixture, in which case flames of this type can often be humidized to advantage, although in the case of the radiant heat burner or humidity it is a distinct disadvantage.

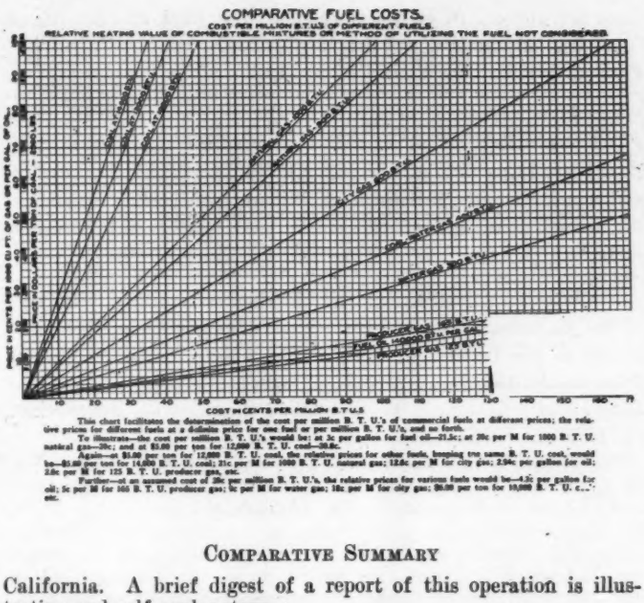
As far as possible it should be borne in mind that the flames should be so shortened as to prevent impingement upon any substance from which heat is being continuously abstracted, it being a fundamental law that there is invariably an incomplete combustion when the elements are united at descendant rather than an ascendant temperature.

Question of Velocity of Tremendous Importance

The question of velocity is also one of tremendous importance, and should be very closely observed in every operation, the question being as to whether the velocity of the gas exceeds the rate of flame propagation and whether the elements pass a heat zone of sufficient catalytic temperature for their combination at a higher velocity than the time element of this union requires.

After exhaustive tests William E. Barrett states it is his belief that the pre-heat of both elements of combustion is of little value. "Theoretically," he says, "there would be a certain possible increase of efficiency, but the practical conditions are surrounded with so many other opportunities for radiation that unless the pre-heating is done at a point immediately adjacent to that of its immediate use there is little, if any, appreciable value. The pressure of gas is a rather more important factor though its variation being principally important in that it varies the rate of air intakes by expansion of the gas into the burner nozzle, thereby producing sufficient partial vacuument to control the quantity of air in the mixture. This pressure (under boilers) should, for best results, not vary below ¾ of a pound to the square inch, and, under maximum conditions, should extend to about 1½ to 1¾ lb. to the square inch on the gas supply."

There is probably no data more illuminating than that afforded by the application of gas to the oil fired furnaces of the Pacific Light & Power Corporation at the Redonda Plant, Los Angeles, California. A brief digest of a report of this operation is illustrative and self-explanatory.


COMPARATIVE FUEL COSTS.
COST PER MILLION B.T.U.S OF DIFFERENT FUELS.
RELATIVE HEATING VALUE OF COMBUSTIBLE MIXTURES OR METHOD OF UTILIZING THE FUEL NOT CONSIDERED.
COST IN CENTS PER MILLION B.T.U.S

Comparative Summary

The detail tabulation of report on following pages 1 to 4 shows that:

Standard gas equal to 1 bbl. of oil, of 331 lb., 6,277 cu. ft.

This figure is derived from the comparison of oil tests No. 1 and No. 2, with gas tests Nos. 4, 5, 6, as follows:

Equivalent evaporation of water from and at 212 deg. Fahr. per pound of oil as fired net, after deducting steam consumption of oil pump and burners, is, as averaged from two tests, 14.57 lb.

The same per barrel of oil of 331 lb., at 18,500 B. t. u., per pound is 4,820 lb.

The equivalent evaporation of water from 212 deg. Fahr. per cubic foot of standard gas (gas corrected to 60 deg. Fahr., and 4 oz. above barometer, and to Standard value of 1,000 B. t. u. per cubic foot is, as averaged from three tests, 0.767 lb. The

CALORIFIC PROPERTIES OF BEST AIR-GAS MIXTURES—(Low Values)
(All at 32° F. and 29.92" Hg.)

Name of Gas.	Volumetric Analysis, Per Cent.									Air.		Gas.		Gas B.T.U.		Mixture B.T.U.	
	CO	H_2	CH_4	C_2H_4	C_2H_6	C_6H_6	O_2	CO_2	N_2	Cu.ft. per Cu.ft. Gas.	Lbs. per Lb. of Gas.	Lbs. per per Cu.ft.	Cu.ft. per Pound.	Per Pound.	Per Cu.ft. 32° F. 29.92" Hg.	Per Pound.	Per Cu.ft. 32° F. 29.92" Hg.
Carbon monoxide..	100	...	...	...	...	..	..	...	...	2.39	2.470	.07807	12.8090	4369	341	1258.6	100.59
Hydrogen.....	...	100	...	...	...	...	..	...	...	2.39	34.32	.005621	177.9093	51892	292	1469	86.1
Methane.....	...	...	100	...	..	..	..	...	...	9.56	17.244	.0447	22.349	21463	959	1176.4	90.81
Ethylene.....	...	...	...	100	..	..	..	...	...	14.34	14.557	.07951	12.578	20053	1595	1931.7	103.97
Ethane.....	...	...	...	...	100	..	..	...	...	16.73	16.115	.08379	11.9354	20481	1716	1196.6	96.78
Benzene.....	...	...	...	...	..	100	..	...	...	35.85	13.194	.2193	4.56	17305	3795	1219.17	102.98
Retort coal gas....	8.6	52.5	31.35	1.1	..	1.1	.03	1.5	3.5	5.0084	12.683	.031872	31.375	17022.7	542.6	1244.1	90.30
Coke-oven gas, rich	7.1	37.4	40.4	2.9	..	2.9	1.6	2.1	5.6	6.381	11.753	.04382	22.8206	15452.9	677.1	1211.7	91.74
Coke-oven gas, lean	6.2	46.2	27.1	1.3	..	1.2	.6	3	14.4	4.4597	9.300	.038705	25.8364	12458.4	482.2	1209.5	88.32
Coke-oven, gas, average.....	6.0	42	34.3	2.0	..	2.0	1.1	2.5	10.1	5.4301	10.872	.04031	24.807	14384	579.84	1211.6	90.1
Oil gas (retort)....	1.0	18.5	52.5	11.7	..	11.8	.5	.5	...	11.3936	14.943	.06153	16.25	19443	1196.5	1219.5	96.52
Carburetted water gas.....	28.1	21.8	30.7	12.9	..	..	.5	3.8	2.2	5.9774	8.9395	.05397	18.5288	12888	659.6	1296.6	94.53
Blast-furnace gas..	27.5	3.0	...	...	..	..	..	10.0	59.5	.7289	.7309	.08049	12.4239	1273.8	102.53	735.9	59.30
Water gas.....	35.93	49.5	1.05	...	..	..	..	4.25	9.27	2.1458	3.964	.04368	22.89377	6344	277.13	1278	88.09
Anthracite producer gas.....	25.7	15.3	.2	...	..	..	.4	5.5	52.9	.9989	1.1586	.069536	14.381	1928.9	134.13	893.6	67.102
Bituminous producer gas (up)...	14.34	2.81	5.56	...	..	..	.10	10.50	66.69	.9374	1.059	.079021	12.654	1397.4	110.43	680	59.15
Do. (down).....	20.0	14.0	2.0	.2	..	..	.1	8.2	55.5	1.023	1.162	.07105	14.074	1849.9	131.45	855.6	64.98
Do. mond.....	12	29	2.0	...	..	..	..	14.5	42.5	1.1711	1.4961	.063169	15.83022	2292	144.78	918.2	66.67
Lignite producer gas.....	20.90	14.33	4.85	....	..	..	.23	8.69	51.02	1.3056	1.5036	.070101	14.265	2276.9	159.62	909.4	69.23
Alcohol.....	...	...	...	...	..	..	...	...	...	14.424	9.06	.01285	7.782	12100.4	1554.9	1202.8	100.8
Gasolene.....	...	...	...	...	..	..	...	...	...	52.74	15.24	.2793	3.58	20519.7	5731.7	1263.5	106.66
Kerosene.....	...	...	...	...	..	..	...	...	...	88.71	15.079	.4748	2.106	20255	9617.7	1259.7	107.2
Natural gas, Kans.	.25	...	98.2	...	..	.1	.25	...	...	9.3969	17.004	.0446	22.42	21301	950.1	1183.1	91.38

Heating value of gases based on experimental value of constituents.

same per 100 cu. ft. of gas is 767 lb. Therefore, the number of cubic feet of standard gas per barrel of oil =

$$\frac{\text{Evaporation per bbl. of oil}}{\text{Evaporation per cu. ft. of gas}} = \frac{4{,}820}{0.767} = 6277 \text{ cu. ft.}$$

All tests were run on what is known at the plant as Stirling Boiler No. 28, having 6,019 sq. ft. saturated steam heating surface, and equipped with a Babcock & Wilcox superheater, located in the second pass, and of 825 sq. ft. superheated steam heating surface.

Gas Burners

The gas burner with which the tests were made was of what is known as the Bakersfield type, and is simply a cast iron elbow 2 in. inside diameter, with one leg about 2½ in. long, and the other about 6 in. long. When installed the short leg sets vertical, the long one horizontal.

The burner is cast with a web at the mouth of the longer leg. A $\frac{3}{16}$-in. hole is drilled in the center of the web. Concentric with this hole, but not all the way through, the web is also drilled and tapped for a ½-in. pipe connection. A pipe screwed into this connection supplies gas to the burner, the necessary air supply for combustion is provided by means of annular openings cast in the web. Nipples of common 2-in. pipe about 6 in. long are set in the short leg of the burner to bring the flame to the desired height above the furnace floor. Two hundred and sixteen of these burners were used.

Gas was supplied to the burners in the following manner: Through each of the three ash pit doors eight 2-in. pipes were extended to within approximately a foot of the wall at the rear of the furnace, each line being provided with nine ½-in. openings to each of which was connected a ½-in. elbow, set vertically. The gas burner was screwed on the upper end of this elbow. These 24 pipe lines, each controlled by a valve, supplied 216 burners arranged in three banks, and practically uniformly distributed over the area opposite each fire door. Each bank of burners thus occupied an area of approximately 27 in. wide by 8 ft. long, which left 22 in. vacant space between the banks, and 11 in. between side walls and adjacent banks of burners.

During the gas tests the oil burners were left in place but disconnected from the steam and oil mains at the unions, and turned down into the recesses, ready for instant connections and use.

The gas burners as installed, passed through a number of the checkerwork openings provided in the oil furnaces, but, as the number was insufficient, it was necessary to provide additional openings to accommodate them. It was also thought desirable to provide additional air spaces.

The total air space as provided for oil burning in the standard oil furnace was 6.33 sq. ft., the total grate surface 105.4 sq. ft., and the total air space with gas burners was equivalent to 9.29 sq. ft. The air spaces of the oil furnace were thus increased about 50 per cent for gas.

The same general arrangement gave a very uniform distribution of gas flame throughout the entire furnace.

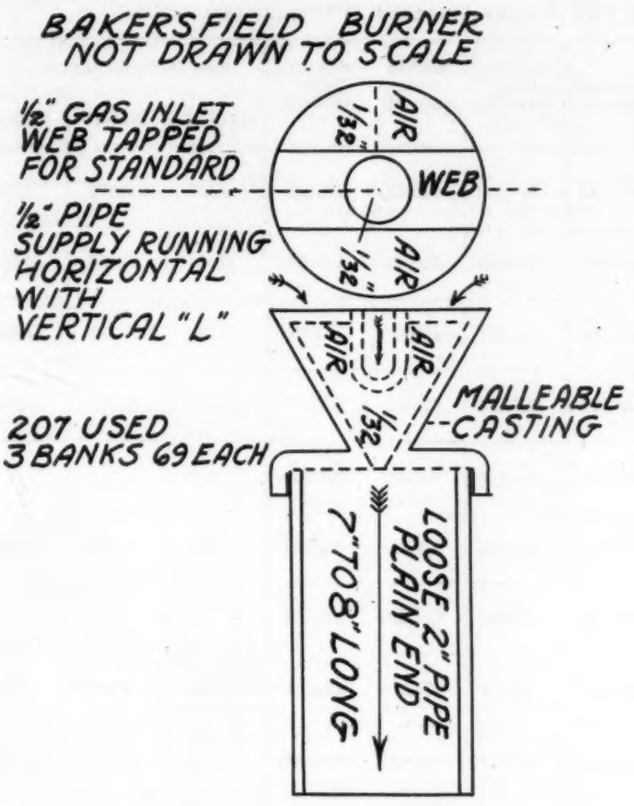
COEFFICIENTS OF HEAT TRANSFER

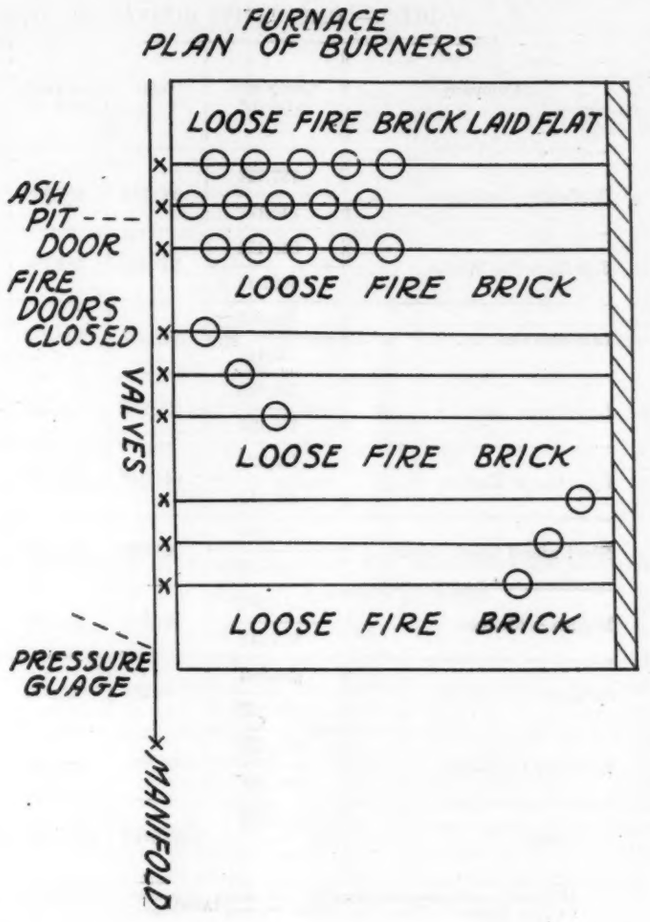
AVERAGE PRACTICE

Thermal Action in Substances.		B.T.U. per Hour per Square Foot per Degree	Apparatus.
Giving Up Heat.	Receiving Heat.		
Liquid cooling.....	Liquid warming	50-75	Liquid heat exchangers, aqua ammonia water and beer coolers, ammonia absorber cooling coils
	Gas warming	2-6	Hot-water radiators and cooling tower surfaces, depending on air velocity and character of water surface
	Liquid boiling	100 10-20 30-50	Shell brine coolers with circulator; tank brine coolers without circulator; double pipe brine coolers depending on velocity and hot liquid evaporators
Gas cooling.....	Liquid warming	2-5	Brine coolers in cold storage rooms depending on air circulation. Air coolers with water or brine coils; economisers
	Gas warming	2-4	Steam superheaters
	Liquid boiling	2-5	Direct expansion ammonia coils in cold storage rooms depending on air circulation. Steam boilers
Vapor condensing.	Liquid warming	150-350 1000	Feed-water heaters and steam condensers depending on water velocity and removal of air on steam side. Experimental feed-water heater high velocity
	Gas warming	2-4	Steam radiators and pipes
	Liquid boiling	400-800	Vacuum evaporators with condensing exhaust steam depending on viscosity of solution

RESULTS OF COMPARATIVE TESTS ON OIL AND NATURAL GAS FUELS AT REDONDO PLANT, PACIFIC LIGHT & POWER CORPORATION, LOS ANGELES, CAL. AUGUST AND SEPTEMBER, 1913.

No. of test	5	6	8
Date of test	Aug. 28	Aug. 29	Sept. 8
Duration of test (Hours)	8	10	8
Object of test (H. P. desired)	930	1,120	930
Type of boiler	Stirling	Class O	No. 24
Kind of fuel	Gas	Gas	Oil
Condition of gas or oil	Dry	Dry	Topped
Kind of furnaces	Peabody	Hammel	Gas Burners
Method of starting and stopping test	Alter.	Alter.	Alter.
Furnace floor surface sq. ft.	105.4	105.4	105.4
Air space, furnace floor sq. ft.	9.29	9.29	9.29
Per cent air space of furnace floor	8.85	8.85	8.85
Waterheating surface floor sq. ft.	6,019	6,019	6,019
Superheating surface floor sq. ft.	825	825	825
Total heating surface floor sq. ft.	6,844	6,844	6,844
Condition of boiler and furnace	Clean	Clean	Clean
Name of burners	Bakersfield	Bakersfield	Hammel
Ratio of total heat surface to furnace floor surface	65:1	65:1	65:1
Size of openings to draft pits, sq. ft.	10	10	10
Ratio of air space in furnace floor to openings to draft pits	0.9:1	0.9:1	0.6:1
Steam pressure by gage in pounds	182	181	182
Steam pressure in oil burners, in pounds			102
Oil pressure on oil to burners in pounds			47
Line pressure on gas in pounds	10.4	8.09	
Pressure on gas at burners, in. water	21.	35.	
Draft in stack, in. water	.64	.66	.70
Draft on boiler side of damper, in. water	.18	.44	.16
Draft under furnace	Natural	Natural	Natural
Average barometer	30.01	30.04	
Steam average Fahr.	563	591	549
Steam maximum Fahr.	569	596	556
Superheat average Fahr.	183	211	169
Superheat maximum Fahr.	189	216	176
External air deg. Fahr.	77	74	69
Boiler room, deg. Fahr.	108	105	89
Feed water, deg. Fahr.	75	75	74
Oil deg. Fahr.			92
Gas deg. Fahr.	81	81	
Flue gas average Fahr.	586	675	581
Flue gas maximum Fahr.	590	683	600
FUEL			
Total oil as fired in pounds			18,015
43 per cent H_2O in Oil per cent			.75
B. t. u. per lb. of oil as fired			18,450
Specific gravity of oil baume, deg.			16.6
Gas passed by meter at line pressure and temperature cu. ft.	188,300	317,800	
Per cent error in meter—slow	10.9	10.9	
Cu. ft. gas corrected for meter error	211,500	357,000	
Factor for converting vol. of gas at observed press. and temp. to 4 oz. above av. Bar & 60 deg. Fahr.	1.612	1.463	1.431
Gas cu. ft. at 4 oz. above av. Bar. & 60 deg. Fahr.	341,000	422,000	
Equivalent cu. ft. at 4 oz. above Bar. and 60 deg. Fahr. on basis of 1,000 B. t. u. per cu. ft.	356,000	540,000	
B. t. u. per cu. ft. of gas at av. Bar. & 60 deg. Fahr. 7 saturated with H_2O Vapor (wet meter used on Junker's calorimeter).	1,001	991	
B. t. u. per cu. ft. of gas at 4 oz. above av. Bar. & 60 deg. Fahr. (Gas dry)	1,044	1,033	
B. t. u. per cu. ft. of gas at 4 oz. above av. Bar. & 60 deg. Fahr. (Dry) taken as standard	1,000	1,000	
Total weight of water evaporated lb. net	202,862	320,358	190,011
Factor of evaporation	1.295	1.308	1.288
Equivalent evaporation from and at 212 deg. Fahr. pounds net	262,500	418,000	245,000
Weight of water evaporated lb. net (Hourly).	25,370	32,036	23,780
Equivalent water evaporated lb. net	32,820	41,800	30,620
Equivalent water evap. per sq. ft. heat surface lb. net	5.45	6.95	5.09
Weight of oil as fired, lb.			2,260
Cu. ft. gas passed by meter at line pressure and temperature corrected for meter error	26,450	35,700	
Equivalent cu. ft. gas at 4 oz. above av. Bar. & 60 deg. Fahr.	42,600	52,200	
Equivalent cu. ft. gas at 4 oz. above av. Bar. & 60 deg. Fahr. on basis of 1,000 B. t. u. per cu. ft.	44,500	54,000	
H. P. developed net	952	1,213	887
Builders rating H. P.	602	602	602
Per cent of Builders' rating developed	158	202	147.3
ECONOMIC RESULTS.			
Equiv. evap. from 8 at 212 deg. Fahr. per lb. oil as fired, pounds net			13.61

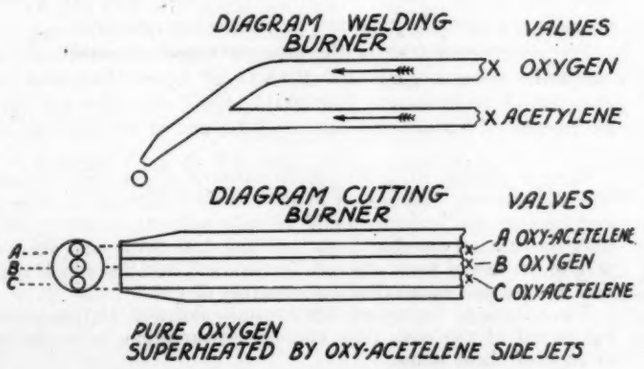




Equiv. evap. per cu. ft. gas at 4 oz. above av. Bar. & 60 deg. Fahr., pounds net	.770	.802	
Equiv. evap. per cu. ft. gas at 4 oz. above av. Bar at 1,000 B. t. u. per cu. ft., pounds net	.737	.776	
Gas cu. ft. at 4 oz. above av. Bar. & 60 deg. Fahr. per H. P. actual B. t. u. basis cu. ft	44.8	43.1	
Efficiency of boiler and furnace per cent net	71.5	75.2	71.6
Total water evap., gross lbs.			195,362
Equiv. water evap., gross lbs.			251,400
Steam consumption of oil pump, lbs.			156
Steam consumption of burners, lbs.			5,220
Total consumption of oil pump & burners, lbs.			5,376
Per cent oil pump & burner consumption of total H_2O evaporated			2.75
Steam consumption of burners, gross lbs. hourly			652
H. P. developed, gross			912
Per cent of rating, gross			152
Equiv. evap. from and at 212 deg. per lb. oil fired, gross lbs.			13.95
Efficiency of boiler and furnace, gross per cent			73.4
FUEL GAS ANALYSIS			
Per cent CO_2 average	12.1	12.1	13.8
Per cent CO_2 maximum	12.6	12.6	14.8
Per cent average	1.6	1.8	2.8
Per cent excess air	7.0	8.0	15.0

Perhaps one of the most important illustrations along the line of the effect of temperature in combustion and showing the catalytic effect thereof is shown by the oxy-acetylene flame. In the case as indicated by sketch of using the welding flame, the composition is a neutral one; the tendency being possibly towards the acetylene side of the equasion.

In the case of the cutting flame, however, the pure oxygen is surrounded by two superheating jets affording a high temperature at the moment of impact. The function of these jets being entirely catalytic and not chemical.



Another instance which should be noticed is the burning of coke or culm which is extremely significant along the lines of interpolation of elements.

A grate has been recently designed possessing high efficiency along this line; it consists of a plate cast with studs or bosses which interpolate the blast at an angle to the fuel bed of about 25 degrees. This at a blast pressure of 5 or 6 inches permits a fuel bed of from 8 to 10 inches depending on the nature of the fuel and the amount of voids without chimneying or channeling and therefore, affording a complete intermixture of the elements.

Low Oven Gas Range Has Outlived Its Usefulness

The type of range with a low oven has already outlived its usefulness, declared F. S. Wade, of the Southern Counties Gas Company, of Los Angeles, in a paper presented at the recent annual meeting of the Pacific Coast Gas Association. We should work unceasingly for the early and complete elimination of this type of range.

If the absurdly small size of many modern kitchens stands in our way we should go one step further, and, through architects and builders, work just as unceasingly for at least 4 x 3 ft. of gas range space.

Byllesby Companies Show Increased Output

Since Jan. 1, the gas output of the various Byllesby companies has increased at a rate approximately 8 per cent greater than for the corresponding period last year. At the present time the companies are reporting weekly gains of from 250 to 300 gas customers.

TABLE I.—COMPARATIVE BUSINESS OF NINE OF THE LARGER MASSACHUSETTS GAS COMPANIES

Company	Gas Made 1915–16*	Total	Gas Made 1914–15	Gas Made 1913–14	Sold by Meter 1915–16	Sold by Meter 1914–15	Sold by Meter 1913–14	Sold for Public Lamps		
								1915–16	1914–15	1913–14
Cambridge Gas Light	737,154	983,351	949,124	934,312	948,029	912,370	897,025	4,151	3,676	3,736
	246,197									
Fall River Gas Works	343,455	703,490	688,781	667,007	643,405	630,836	618,468	5,861	5,870	6,025
	360,035									
Lawrence Gas	380,362	549,807	528,272	509,398	509,447	486,819	474,763	343	332	1,038
	169,445									
Lowell Gas Light	510,825	696,952	655,711	650,572	677,381	626,132	622,180	18,439	18,207	18,134
	186,127									
Lynn Gas & Electric	482,923	944,240	898,033	924,307	861,954	824,248	859,196	482	.....	.....
	461,317									
New Bedford Gas & Ed. Lt.	209,590	648,206	635,627	613,852	596,808	576,713	551,341	23,163	21,728	22,042
	438,616									
Malden & Melrose	311,261	867,202	812,902	763,620	645,902	614,920	575,974	.....	.....	.....
	555,941									
Springfield Gas Light	483,280	1,018,501	909,023	887,672	969,106	876,376	842,688	3,404	4,261	4,639
	535,221									
Worcester Gas Light	615,173	1,008,691	929,525	942,991	956,839	884,528	886,906	7,512	7,274	7,161
	393,518									
Totals	4,074,023	7,420,440	7,006,998	6,894,031	6,808,871	6,436,942	6,368,541	63,355	61,348	62,765
	3,346,417									

All figures represent thousands of feet of gas, to nearest thousand.
* Upper figures = Coal Gas; Lower figures = Water Gas.

Large Connecticut Gas Companies Gain in Output and Revenues

Annual returns of Connecticut gas companies, for the year which ended June 30, 1916, as filed with the Public Utilities Commission of the State the past two weeks, show marked increases in output, sales, income and plant values as compared with the figures for the year before.

Noteworthy gains in gas sold are registered by the Bridgeport, Waterbury and Derby companies, the ratios being 29, 24 and 17 per cent, respectively, more than for the year 1914-15. A generally larger increase in the output of water gas is recorded, as compared with the manufacture of coal gas. The Bridgeport, Danbury & Bethel and Waterbury companies generate only water gas, and these companies increased their output very materially.

The New Britain company increased its water gas output about 26 per cent and the Meridan company's volume was about 22.5 per cent more water gas than in 1914-15, the coal gas manufactured being decreased about 20 per cent.

It is to be noted that the Hartford company reduced its percentage of unaccounted-for gas by a considerable per cent; Derby Gas Company improved its losses slightly, but other companies show increased ratios of gas which was unaccounted for. A generally slight reduction in candlepowers and in calorific values are recorded for most of the companies, as compared with averages for 1914-15.

The use of domestic heating and cooking apparatus are obviously growing by leaps and bounds. The Hartford company's report indicates the almost phenomenal record of 6,200 gas ranges installed during the year, and also 3,260 water heaters. Other companies report substantially augmented range, heater and water-heater installations, reflecting the growing use of gas for these purposes. All the companies noted have increased their plant and equipment assets, and the growth in number of customers is gratifying.

Massachusetts Gas Companies Make Substantial Gains in Last Business Year

Sales for Street Lighting Represent Increase Over Two Previous Years—Records of the Output of Coal Gas Per Ton Carbonized Indicate Improvement in Manufacturing Efficiency

According to their annual returns for the year which ended June 30, filed with the Gas & Electric Light Commission the first week in September, the Massachusetts lighting companies made considerable increases in output, sales and gross earnings. This is especially true of the larger companies, the results of whose business in comparison with former years, is appended in the tables herewith. The companies given are the larger gas companies apart from the Boston Consolidated.

It is particularly worthy of note that in the nine companies the sales for street lighting, in the aggregate, represent a positive gain over the two previous years, though this field has in some cities been practically conceded to the electric companies.

The commercial sales of the nine prominent Massachusetts gas companies show a gain over 1914-15 of 6 per cent, and over 1913-14 of 7 per cent. The total volume manufactured shows an increase of 5.9 per cent over 1914-15, and of 8.6 per cent over 1913-14.

Were it possible to determine the amount of gas used for heating and cooking purposes, a clearly marked increase in this department of the business would be reflected. It is also probable that the use of gas for house lighting has fully held its own, despite the use of more efficient burners and mantles which might tend toward the economical consumption of gas.

The returns to the commission are quite detailed, and we present the record of the coal, coke and oil consumption, with the cost of each of these items.

TABLE II.—MATERIALS USED IN WATER GAS MANUFACTURE, MASSACHUSETTS COMPANIES

Company	Coal Tons	Coke	Breeze	Oil, Gal.	Average Cost Coal	Average Cost Coke	Average Cost Oil
Cambridge	‡735*	‡3,959*	....	1,044,593	$4.54	....	.0398
Fall River	....	4,718*	....	1,263,498	4.306	5.25*	
	710†	298†	....		....	....	.04005
Lawrence	163*	2,736*	....	680,465	5.60*	....	.04254
	....	756†	....		4.00†	....	
Lowell	....	3,214*	....		....	5.25*	.039
	....	5,222†	....	787,138	....	3.25†	
Lynn	....	8,569*	....		....	....	.035
	....	.....	....	1,620,366	....	3.78	
New Bedford	3,325*	4,301*	....		5.25*	....	.0346
	2,738†	2,534†	....	1,557,100	3.98†	....	
Malden-Melrose	....	7,570*	....		....	....	.034
	61†	2,057†	3,882†	1,868,449	4.075	....	
Springfield	389*	7,499*	....		....	....	.034
	....	4,680†	80†	1,750,113	5.96	....	
Worcester	....	6,077*	....		....	....	.0365
	5,323†	415†	6,019†	1,417,404	4.31	....	

* Used for generating the gas.
† Used for generating the steam.
‡ Steam from Central Plant.

Records of the output of coal gas per ton of coal, as compared with the year 1914-15, indicate that most of the companies have improved the efficiency of manufacture. The high figure for the last year is 12,396 ft. per ton, and the low figure is 9,536, but good averages of above 11,000 ft. are shown by a majority of the companies.

TABLE III.—COAL USED IN MANUFACTURE OF COAL GAS, WITH AVERAGE RESULTS

Company	Tons Coal 1915–16	Tons Coal 1914–15	Feet of Gas Made per Ton Coal, 1915–16	Feet of Gas Made per Ton Coal, 1914–15	Average Cost per Ton, 1915–16
Cambridge Gas Light	64,670	61,893	11,399	11,810	$3.66
Fall River Gas Works	29,550	31,410	11,622	11,287	3.758
Lawrence Gas	31,915	31,269	11,918	11,740	4.938
Lowell Gas Light	41,818	45,741	12,215	11,950	4.88
Lynn Gas and Electric	41,646	39,587	11,620	11,910	3.78
New Bedford Gas & E. Lt.	18,410	18,867	11,384	11,220	3.95+
Malden & Melrose Gas	32,642	31,922	9,536	10,550	4.309
Springfield Gas Light	38,988	32,628	12,396	11,070	4.249
Worcester Gas Light	50,469	47,791	12,179	12,420	4.545

Efficiency Methods Reduce Arc Maintenance Expense Almost Thirty Per Cent

Answering the query as to whether the results secured by intensive efficiency work are remunerative in proportion to the time, effort and cost of making the necessary studies, E. L. Hall, chief engineer of the Portland (Ore.) Gas & Coke Company cited, as an instance, one case in which a saving of almost 30 per cent was affected—representing a saving of $9,433.68 per year in this one item alone—in his paper on "Efficiency Methods in Public Utilities" read before the recent annual convention of the Pacific Coast Gas Association. Rough computations of the expenditures in connection with strictly efficiency work have shown the returns to be considerably better than ten to one," he stated. "As an instance of the large sums of money, which can be saved by these means, it may be cited that in the arc maintenance department, the operating expense was reduced from $31,114.11 in 1914 to $21,780.43 in 1915, or from a unit cost of $0.292 per arc to $0.239 per arc, which figures include all allowances for departmental and other overhead expenses, together with the expense for extra inspection, and the cost of time study.

"As a result of this, the cost was reduced to the consumer by the equivalent of 5 cents per month, per arc, which reduction was again repeated during the present calendar year.

"Lest it may be felt that such a reduction forms only an isolated example, it may be stated that similar reductions have been experienced in every single instance, where efficiency methods have been applied and the conclusions consistently carried out."

TABLE IV.—RESIDUALS MADE, AND PRICES OBTAINED, MASSACHUSETTS GAS COMPANIES, 1916

Company	Tons, Coke	Gals., Tar (Coal Gas)	Gals., Tar (Water Gas)	Ammoniacal Liquor, Gals.	Prices Obtained, June, 1916			
					Coke	Tar (Coal Gas)	Tar (Water Gas)	Am. Liquor
Cambridge	49,253	956,718	125,351	34,391	$4.25–5.00	3 cents gal.	2.5–4.5 cts. gal.	8 cents lb.
Fall River	22,745	410,468	90,117	188,957	5.50	3.5 cents	4 cents	7.5 lb.
Lawrence	28,004	464,918	.....	633,653	4.50 by carl'd	3.5 cents	.....	.....
Lowell	28,056	570,153	98,377	519,252	6.38	3–10 cents	2–4 cents	7.75 lb.
Lynn	35,117	543,021	129,629	591,012	4.50–5.50	3.5–5 cents	2.5–3 cents	2.13 gal.
New Bedford	11,002	239,300	.....	43,026	5.50–6.00	10 cents	5 cents	8.5 lb.
Malden-Melrose	16,485	412,845	284,415	408,206	3.25	3 cents	2.5 cents	7.75 lb.
Springfield	21,000	642,020	188,497	502,975	6.50–7.00	3 cents	2.5 cents	7.75 lb.
Worcester	32,249	574,231	197,870	*1,245,405	7.00–7.75	3 cents	6 cents	6.75 lb.

* Pounds.

The sale of residual products forms an important part of the gas business, and in Table IV are given the amounts of coke, tar and ammoniacal liquor produced in 1915-16, together with the prices obtained. Of course in the case of the coke produced, prices vary with the mode of disposal and method of marketing this valuable by-product.

Pacific Gas & Electric Company Has 95 Employees who have been in Service More Than 25 Years

The Pacific Gas & Electric Company of San Francisco has 95 employees on its rolls who have been in the service more than 25 years. E. C. Jones, with a period of service between 25 and 29 years, is numbered among these. Also included in the group are eight who have been in the company's employment over forty years.

AMERICAN
GAS LIGHT JOURNAL

FIFTY-EIGHTH YEAR.

Published Weekly by
AMERICAN GAS LIGHT JOURNAL, INC.
42 Pine Street, New York, N. Y.

ELBERT P. CALLENDER, President
STANTON G. KRAKE, Vice-President
FREDERICK A. SOUTHWORTH, Treasurer.
CHARLES H. WADELTON, Secretary and Manager.

EUGENE C. MILES, Editor

Subscription, $3.00 per year, including postage in the United St tes, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.
In Canada, $4.00. Foreign, $5.00.

Entered at the Post Office, New York City, as Second Class Matter.

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Keeping Pace With Progress

A family moved into one of those 3,300-population communities which now boast of an electric cooking rate of five cents or less per kilowatt hour. The lady of the house had always used gas. She did not know very much about electricity so she wrote to a friend who was interested in the gas business, and who had previously been engaged in the electric business. She told him what the rates were, what an electric range would cost—the one she was considering was built on the fireless cooker principle—and asked his advice.

It happened that at this particular time there appeared in some of the household magazines a number of advertisements of gas ranges built on the same principle upon which these electric ranges were built. The electric light company, salesmen had convinced this woman that this was the only correct principle upon which to build a range. Her friend, accordingly answered her letter by writing her that the sum of money she would have to pay for the electric range would buy a gas range built on exactly the same principle as the electric range, but which would cost a great deal less than the electric range to operate. He advised her to call at her gas office and learn the details there.

She followed his advice and called at the gas office. There a clerk told her that no gas range such as she asked for had ever been manufactured, and that the only ranges he could sell her or give her any information about were the regular stock patterns displayed on the sales floor. This call at the gas office proved so unsatisfactory and so unpleasant that she called at the electric light company's office on her way home and left an order for a thirty day's trial of an electric range. She now does all her cooking with coal and electricity.

Whether the particular clerk who answered her inquiries was incompetent, whether the company did not advocate new styles of ranges, especially those built on the new principles, or whatever the reason may have been it does not change the actual results. The gas company lost a good customer it might have retained had a more intelligent effort been made to serve her interests rather than the convenience of the salesman.

This case emphasizes the fact that the day when gas cooking had no competition is past. It emphasizes the fact that the best selling service rather than the cheapest product is the one that eventually wins. It does not matter so much how much it costs to do the work as it does how carefully the interests of the customers are looked after.

It would seem that just as it has paid the electric light companies to place samples of the latest advances in electric appliances on exhibition, it would pay gas companies to exhibit on their sales floors samples of the latest advance in gas appliances. Such exhibits would not necessarily mean that the gas company would have to sell these appliances. They would mean that the gas company employees would become better educated in regard to gas appliances and gas-appliance progress, and could intelligently answer all questions asked them.

Do Gas Companies Discourage the Inclination to Write on the Part of their Employees?

For some time this journal has been endeavoring to arouse the gas man generally to an appreciation of the value to him, in his progress in position and in knowledge, of the setting down on paper of a record of his thoughts and experiences. Further, we have endeavored to induce him to prepare these writings with the purpose of seeking to have them published. Certain critics have informed us that our efforts would be better spent in endeavoring to induce the companies employing him to permit him to write for publication, since he, even though he might desire to do so, considers it better business judgment to keep his name constantly on the company's payroll than to have it appear occasionally on the printed page as the author of an article which contains information which the company would prefer to keep private; in other words, that the employee with literary inclinations is very much a *persona non grata* on the gas company's working force.

This journal is not inclined to accept this view, though it has been so often advanced that it warrants consideration. Gas companies are not run by narrow-gauged men. The industry has grown to too large proportions to make such management an economic possibility. Gas companies, moreover, are very much

interested in better employees, and there is no practice that is more conducive to forming orderly and efficient habits of thinking in a man than is the practice of setting down in writing a record of his thoughts and experiences.

This journal does not advocate a general release on the part of gas companies of information that might be termed half-baked; for instance, descriptions of tests or experiments that have as yet reached no definite point and may or may not prove successful in establishing or disproving the soundness of the theory on which they are based. It does, however, assert that the company which hampers or discourages the inclination of employees to write descriptions of completed work, or discussions of subjects on which they have a sound knowledge, is following a short-sighted policy, and one that will, in the long run, prove exceedingly destructive to efficient organization.

Gas for Street Lighting

Notwithstanding the fact that gas for lighting purposes constitutes almost 50 per cent of the total gas sales in this country, and that the total send out of gas for all purposes has been steadily increasing in large amounts from year to year, the gas man in general has been kept so busy combating the assertion of his electrical competitor that gas for lighting, even in the home is a dead issue, that he has not been able to find the time to uphold his argument in the street lighting end of the business.

The result of this enforced lack of verbal combativeness has been that the electrical man has gained the impression—if we are to judge by his utterances—that the gas lamp holds about the same status on the public thoroughfare as does the rapidly disappearing, though long surviving, horse car.

The returns of the Massachusetts Gas Companies,—which are printed elsewhere in this issue—showing, as they do, that the sales of gas for street lighting in this thickly settled and progressive section of the country are not only holding their own, but actually show an increase, should come as a thunderbolt out of a clear sky to our electrical friends, and to such weak-kneed gas men who are willing to concede any argument to the one who can talk the loudest and most convincingly.

Despite the fact that they have doubtless been assured many times that gas for street lighting is an antiquated survival of a past age, despite the extensive development of their state's hydro-electric possibilities, the Massachusetts gas men have apparently not meekly surrendered their street lighting loads, but, on the contrary, have pushed this end of the business with the same constructive enthusiasm that they have shown in their other fields of service.

Bellefontaine Raises Its Fuel Gas Rate

Bellefontaine, Ohio, which has the distinction of being the only city in that state which operates its own gas plant, has been finding it a troublesome problem to make both ends meet on the gas utility.

Various reasons have been advanced, the high cost of materials being the most loudly maintained, but the fact that the plant is obsolete and in need of extensive remodeling, or complete rebuilding, seeming the most logical.

Various expedients have been suggested to remedy the condition, the first being to raise the rates, the second to remodel or rebuild the plant and the third to sell the franchise to a private corporation. The first, with an important modification, has been adopted, at least as a temporary expedient. The rate for fuel gas has been raised fifty per cent, to an almost prohibitive figure for this purpose, and the lighting rate remains the same as before.

This solution is typically "municipal," and essentially stupid.

The motive behind it, of course, is politics. To have raised the lighting rate would have aroused widespread protest on the part of a large proportion of voters. The users of gas for fuel must, of necessity, be in much smaller numbers. But every citizen of Bellefontaine—especially those owning property—is affected by this subterfuge to as great, if not greater, extent financially than he would have been, had the lighting rate been figured in the raise in its proper proportion.

One of the principal inducements that attract industrial plants to any locality is cheap fuel. At its former rate, Bellefontaine approximated this insofar as gas fuel is concerned. Yet, when other cities are petitioning public service commissions to permit their gas companies to adopt a sliding scale of rates, Bellefontaine raises its fuel rates fifty per cent, and thus closes the door to the entrance of gas-fuel-using industries, which would have brought new citizens to the city, would have provided work for those already there and would have enhanced real estate values. Even the disposal of the franchise to one of those "soulless" corporations, we so often read about, but seldom encounter, would have been better for Bellefontaine than the course adopted.

The American Gas Light Journal holds no brief for gas for industrial fuel as against gas for lighting. It is, on the contrary, for gas for every possible purpose for which it is economically and practically adaptable. But it does maintain, as a fact too evident for dispute, that the fuel gas rate should be considerably less than the rate for gas for lighting. The first represents gas in bulk (in last week's issue there was described a single installation where from ten to twenty thousand cubic feet of gas is consumed in an hour). Gas for lighting, on the contrary, represents gas in relatively small quantities, distributed to innumerable points, each necessitating such added items of expense as meter readings, inspection, maintenance, etc.

We do not assert even that Bellefontaine can afford to furnish gas for fuel at its former rate. Perhaps a private corporation could, but that is aside from the question. We assert simply that the fuel load should not be made to carry the whole of the added burden, that the lighting consumers should shoulder their proportionate share, and that politics is a poor element to add to the process of manufacturing gas.

Why We Believe in Gas

This journal advocates gas, not so much because it is an organ of the gas industry, but because it believes in conservation and the elimination of waste. No matter how large the country's available supply of coal may be, the present generation owes it to posterity to get out of every pound of the substance every valuable by-product that it contains. This fact is becoming appreciated just as much as the injustice of saddling on future generations the payment of road bonds, long after the highways for which the moneys were expended have ceased to exist, or have been completely rebuilt, has lately come to be understood.

How anyone who has stopped to consider the countless millions of dollars in valuable by-products that have gone up in smoke in bee-hive ovens can fail to be impressed that in furthering the use of gas he is rendering a real patriotic service to his country is difficult to imagine.

Some weeks ago we published in these columns an article written by W. H. Gartley in opposition to the proposed Government nitrogen plant. Mr. Gartley showed quite clearly, in our opinion, that not only would the establishment of such a plant destroy the value of certain by-products of gas manufacture, but that the supply of the very by-product, whose value will be almost totally destroyed by the establishment of such a plant, will, by 1917, be sufficient to yield 500,000 tons of nitric acid annually. There are several means of making nitric acid. But, if the electric process is insisted upon, a cheap means of generating electricity in large quantities is essential.

At the beginning of the present European war, Germany found herself cut off from her water-power nitrogen plants in Norway. Apparently she has not suffered to any great extent on this account, as she immediately substituted gas from by-product coke ovens for water power, and continued her nitrogen extraction in her own country.

Our by-products coke oven men have presented some alluring figures in regard to the relative cost of the various products obtained from their works. The cost of the gas may range from practically nothing up to a reasonable figure, depending upon the point of view, whether it is considered as a product in itself or only as a by-product to the manufacture of coke. These figures are an argument in themselves. A more potent argument is in the large number of the wasteful beehive type of ovens that the establishment of such a plant would eliminate in a coal field, for instance, where otherwise there would be no available use for the gas that could be produced.

Advocate Dual Lighting Service for Every Home

C. H. French and C. J. Van Gieson Assert that Satisfaction of Customer Should Be Sought Irrespective of Department or Company the Engineer or Salesman Represents

A good lighting installation can be designed equally as well for either gas or electricity, but it would be to the customer's advantage to recommend a dual installation, designed so that either gas or electricity can be used independently or one combined with the other. This assertion was made in a paper presented at the annual convention of the Illuminating Engineering Society, held Sept. 18-20, in Philadelphia, in a paper on "Gas and Electric Lighting in the Home," by C. H. French and C. J. Van Gieson, from which the following has been abstracted:

Little Question as to Advantages of Dual System for the Home

The idea of a dual system throughout the house should be advocated and equal consideration given to both the use of gas and electricity, whether the salesman or engineer represents a gas company, electric company or a combination company.

If the idea of a dual lighting installation is put into effect, all engineers and salesmen should be instructed that they must recommend both gas and electricity, and, at all times, to adhere strictly to this plan in their selling arguments.

There is little question but that the dual service is the one which should be recommended for every home. If we are broad-minded enough, we can readily see that we will be doing a universal good to the people in our various communities in recommending such a system.

There is little doubt that more gas and electricity would be used if this plan were adopted.

A great many engineers and salesmen representing either gas and electric companies, or gas and electric departments of combination companies, believe that they are doing good business if they secure a straight gas or electric installation. The electric representative is too prone to recall the fish-tail burners, used without reflecting or diffusing auxiliaries, and forget the rapid strides which have been made in the gas lighting field during the past few years.

On the other hand, the gas company representative is very liable to present to the customer costs and lighting data based on the use of carbon filament lamps, and ignore the more recent developments.

This condition does really exist among the men in the field and we should not try to evade it, but instead, should take steps to eliminate the practice.

A good lighting installation can be designed equally as well for either gas or electricity, but it would be to the customer's advantage to recommend a dual installation, designed so that either gas or electricity can be used independently or one combined with the other.

Combination Fixtures Condemned

Combination fixtures should not be used, as nearly all of those on the market at the present time are inartistic. The complicated arrangement of the units in most types of combination fixtures usually prevents either illuminant from performing in the most effective manner.

Where a dual system is installed, and the center ceiling lighting is electricity, and the sidewall lighting gas, both the gas and electric units will be more frequently used than if there was a combination fixture in the center of the room. There are some cases, however, where the center lighting is gas and the sidewall lighting is electric, but this will not be found as universal as the first mentioned system.

In houses that have been built within the last ten or fifteen years, where combination fixtures have been installed, the consumers use either gas only or electricity only. If gas is generally used, it will be found that the electric lamps are missing from the fixtures or have burned out.

On the other hand, if electricity is being generally used, the gas burners will be found in such a condition that they cannot be used. This emphasizes the need of systematic inspection of both the gas and electric departments. There are a few companies, who have established maintenance departments, which make three or four inspections annually. These departments are proving of mutual benefit and satisfaction to the companies and to the consumers.

There have been cases brought to the attention of the authors, where certain fixtures had formerly been used for at least two or three hours daily, but on which the burners or lamps had burned out or been broken, and, through the neglect of the customers to order new mantles or lamps, the burners have been out of use for many months. Naturally the consumers have gotten out of the habit of using these particular fixtures and feel, erroneously, that there is little need for them. This, of course, is a loss, in consumption to the company. Where the house maintenance plan is in operation, cases of this kind are generally eliminated.

A Dual System Outlined

Gas and electric outlets for the use of appliances should be considered when laying out the general lighting systems. If we accept the policy of the dual system, it will be necessary to make a distinction between the inexpensive home and the more pretentious residence. For convenience, residences may be classed as follows:

Class A—Houses costing less than $4,000.00.
Class B—Houses costing more than $4,000.00.

Naturally, there will be variations from these classifications, and discretion must be employed in applying suggestions. At all times the general tone of the glassware and the design of the fixtures should harmonize with the decorations of the room, and the designs of the sidewall and center fixtures should be uniform in each room.

Kitchen: Efficiency of light utilization and ease of cleaning govern the choice of the unit for this room. It is one of the rooms in the house where artistic appearance is not a determining feature. A high intensity of light is needed where food is being prepared. For the electric outlets, 60 to 100-watt tungsten lamps or inverted single mantle gas units or small multiple-mantle gas burners are desirable.

The size of the room, height of lamp above the floor, and the color of the walls have to be taken into consideration as to the candlepower of the units recommended. Prismatic glass or smooth dense opal reflectors, bowl shaped, should meet the glassware requirements for this room.

Except in very small kitchens, at least two lighting outlets should be installed, at points where most of the work is to be done, such as over the sink and range.

At least one base-board outlet should be installed for the use of an electric iron. The gas iron is connected from the end of the manifold of the gas range, or by a hose connection from the sidewall bracket. The best method, however, is to install a flush cover plate in the sidewall to which the gas tubing may be attached.

Living-room: The lighting for this room should be planned with special reference to comfort and convenience. There should be a semi-indirect fixture in the center of the ceiling, and proper outlets for portable lamps and sidewall gas brackets. Gas base-board outlets should be installed so that portable lamps or a heating stove may be used. The flush cover plate, now being generally used is a specially designed neat appearing gas valve, which is installed preferably in the sidewall 3 ft. above the floor. This device merits serious consideration on the part of engineers, architects, plumbers, builders and owners of new and old houses, as it provides the best method of making portable gas connections to the sidewall rather than from tubing attached to the center fixture in the room. Where there is an open fireplace, an outlet should be installed for either a fireplace heater or a gas log.

Dining-room: The lighting in this room should consist of a center fixture of the semi-indirect type over the dining-room table, and two or more sidewall gas brackets, equipped with small multiple-mantle burners. Although the semi-indirect fixture is being quite generally used, there is still a considerable demand for domes over the dining table. When the latter type of fixture is installed, care should be taken to use a bowl or shade of some type to cut out the glare from the lamp or mantle. The most pleasing effects are obtained when the glassware conforms to the color scheme of the room as nearly as possible. It is advisable to have several baseboard receptacles for fans and vacuum cleaners as well as a floor receptacle in the center of the room for the use of various electrical appliances. One or two flush-plate connections would be advisable to install so that a portable gas heater, coffee percolator or chafing dish could be conveniently attached.

RECEPTION HALL: A center unit is recommended here. There should also be a sidewall gas bracket equipped with multiple-mantle burner to match, in design and color, the hall decorations and the center unit. It is particularly advisable that the electric hall lights be controlled from the sidewall switch placed near the entrance door. The gas bracket should be equipped with pilot.

UPPER HALL: Combination bracket with multiple-mantle burner and a low wattage tungsten lamp with diffusing glassware should be installed here. The hall lighting should be controlled by a two-way switch so that it can be lighted either from the head of the stairs or the lower hall.

BED-ROOM: A ceiling outlet in the center of the room equipped with a semi-indirect fixture, should be installed here. In addition to this, combination brackets should be placed on each side of the dresser. It is also advisable that an electric base-board outlet be provided for a fan, heating pad or other appliances that are to be used in the bed-room. Also, a flush-plate gas outlet should be installed, to which a heating stove can be attached.

BATH-ROOM: The lighting in the bath-room should consist of two combination brackets, one placed on each side of the mirror. Multiple-mantle burners should be used on the gas units. Gas outlets should also be provided for a heating stove and a wall type nursery burner.

CELLAR: One electric light should be installed at the foot of the stairs, and one at a most convenient place in the cellar, so that light will be thrown on the furnace and coal bins. One or two gas fixtures should be installed so as to give light at the points mentioned. The electric lights should be controlled from a switch either in the kitchen or at the top of the stairs. Gas brackets should be equipped with pilot light.

In many houses, the laundry is located in the cellar, and, in this event, additional outlets should be installed for the use of gas and electric appliances, such as electric irons, gas irons and laundry stove.

PORCH: The porch is becoming a very popular asset to the house the year around. There should be two outlets installed, properly placed and equipped with colored glassware. Electric ceiling units are desirable for porch lighting, and should be controlled from a switch in the vestibule or hall. There are ornamental porch brackets which are very often used, one on either side of the entrance. These can be obtained both for gas and electricity.

IMPROVEMENTS IN RESIDENCE LIGHTING

Many papers have been written on the subject of residence lighting and big strides have been made in the last few years in the improvement of both gas and electric service.

If proper thought and consideration is given to the lighting specifications and fixtures, there is no reason why every home should not be equipped to give equally good service from either.

An automobile would not be expected, month after month, to run without cleaning and adjusting, if good results are desired. Likewise, gas and electric units should receive the same systematic attention. Glassware and metal parts of the fixtures should be kept clean and broken mantles or burned out lamps should be replaced as soon as possible.

Designing a good dual installation is becoming more difficult as time advances because of the fact that fixture and glass manufacturers, with the exception of those who are especially interested in a particular line of lighting units, seem to be gradually eliminating gas lighting apparatus. This would seem to indicate that a campaign of education along gas lighting lines should be started among fixture and glassware manufacturers.

If the plan as recommended in this paper should be adopted, its most effective use would depend upon the upkeep of the equipment.

Therefore, it is essential that the lighting engineer see to it that his installations are maintained in the proper manner. No electric or gas installation will maintain itself.

The lighting engineer should be as much interested in maintenance as any other department of the company, for, upon maintenance, depends the success or failure of his plan. In order to put any plan into effect, definite directions for lighting the home should be laid down by the company, somewhat in the manner designated, and all salesmen should then be required to adhere strictly to this plan in their selling arguments, whether they represent the gas or electric department.

The Importance of Sizing Equipment as Applied to the Sale of Coke in Small Towns

E. C. Campbell Describes Experience of Benton Harbor-St. Joseph Gas Company in Disposing of Its Coke—Sales Raised from 700 Tons to 4,800 Tons in Three Years

In the State of Michigan approximately 98 per cent of the artificial gas companies are manufacturing coal gas, and there is a great volume of coke manufactured. In the larger companies it has been demonstrated that, in order to successfully market their great volume of coke, crushing and sizing machinery is necessary, stated E. C. Campbell, manager of the Benton Harbor-St. Joseph Gas Company, in a paper presented before the Michigan Gas Association at its recent annual convention.

In the Fall of 1913, the Benton Harbor-St. Joseph Gas Company, changed to a coal gas operation. Prior to that time there had been sold in the communities of Benton Harbor and Saint Joseph, approximately 300 tons of coke per annum. This production required the disposal of upwards of 5,000 tons of coke per annum, and it was necessary to create a market for this production. The policy the first year was to "feel out" the demand for the various sizes of coke and the only sizing employed was hand-forking. At the end of the 1913 winter season the coal crushing machinery was used to partially supply the demand for smaller sizes of coke, which it was impossible to secure by the impractical method of forking. This make-shift, however, was a very costly operation.

E. C. CAMPBELL

CRUSHING AND SCREENING APPARATUS DESCRIBED

From Oct. 1, 1913, to April 1, 1914, approximately 700 tons of coke was sold. In the Fall of 1914, a simple crushing and screening apparatus was installed at a total expense of approximately $1,200. The company's equipment includes a crusher, consisting of two corrugated rolls 26 in. in diameter by 24 in. face. The bearings are adjustable to crush 1½ in. to 4 in. lump coke. There is a 4 ft. square hopper above the crusher. There is also a rotary screen 3 ft. in diameter by 12 ft. long, which is constructed of No. 10 perforated steel plate. The screen is divided into three sets of perforations. One section contains ½ in. and ¾ in. perforations through which passes the breeze, another contains 1½ in. perforations through which passes the chestnut coke, the third section contains 2½ in. perforations through which passes our range coke. The remaining coke, which goes through the screen passes over the end and constitutes our egg coke. The revolving screen is connected with a chain drive and is exposed to the weather. It is driven by a five hp. motor operated from the discharging floor of the retort house.

The machinery has been in constant operation for two years, and the only upkeep necessary so far has been one renewal of the plates of the screen. The daily cost of operation is nominal considering the labor expense necessary in hand-forking coke. The equipment is so constructed that it is very easy to bypass the crusher, and deliver the coke direct to the rotary screen. The supporting structure is of timber construction.

OUTFIT PREPARES COKE IN FOUR SIZES

The outfit prepared coke in four sizes: Egg, range, chestnut and breeze. During the season of Oct. 1, 1914, to April 1, 1915, the company sold approximately 2,200 tons, an increase of 300 per cent over the previous year. During the season just closed, from Oct. 1, 1915, to April 1, 1916, the sales amounted to approximately 4,800 tons.

The first season the company was engaged in selling coke it was able to anticipate a great demand for range coke. At the present time its business in the various sizes may be divided as follows:

Egg 15 per cent; range 60 per cent; chestnut 25 per cent.

During the first winter practically no business was developed for chestnut size coke. At the present time it is difficult to fill the demand for that particular size, inasmuch as all of the small and medium stoves and base burners are using it. The local coal dealers have reported a very evident falling off in the sales of chestnut hard coal, which formerly served the demand the chestnut coke now supplies.

Complete Record Kept of All Sales

A complete and accurate record of all coke sales has been kept, and an inspection of it reveals that a very large percentage of the people using coke the first season of 1913 did not re-order. A personal canvass showed that the cause of their not re-ordering was generally attributed to the fact that they did not receive the proper sized coke to give the maximum efficiency. After the sizing equipment had been in operation these same people were re-canvassed and furnished with a smaller or larger sized coke, whichever the need might have been, and, as a result, they secured satisfaction and became permanent customers.

A further analysis shows that in the season of 1913-14, they sold 700 tons of coke to two hundred people, an average of a little over 3 tons of coke per person. In the season of 1914-15, they sold 2,200 tons of coke to four hundred and fifty people, an average of approximately 5 tons per person. In the season of 1915-16, they sold 4,800 tons of coke to eight hundred people, an average of 6 tons per person.

Data From Other Companies

In securing data to bear out the importance and advisability of preparing and sizing coke, they sent out typewritten questions to Michigan companies inquiring of their policies. They received thirty-seven replies. Thirty of these replies came from companies marketing less than 10,000 tons of coke, per annum, and seven replies from companies marketing in excess of 10,000 tons per annum.

In the case of the seven companies all prepared and sized their coke. In the case of the thirty companies marketing annually under 10,000 tons only 37 per cent sized their coke.

In the case of the seven companies the entire production was sold locally, 95 per cent of it being sold for domestic purposes and 5 per cent for industrial purposes.

In the case of the thirty companies 93 per cent was marketed locally and 7 per cent out of the city. Of the 93 per cent sold locally, 86 per cent was sold for domestic purposes and 14 per cent for industrial purposes.

The average winter retail price secured by the seven companies was $6.35 per ton, and the average winter price received by the thirty companies amounted to $5.93 per ton.

A close analysis of the above figures would show that where the coke was prepared the selling price per ton yielded 42 cents per ton more than where the coke was not prepared, and, in addition, that a larger percentage was sold for domestic purposes, which condition, of course, yields a higher price per ton.

An inspection of the figures further reveals that in the case of the seven companies the average length of carbonization was five hours, and in the case of the thirty companies the average length of carbonization was six hours. It was also found that in practically every instance the company was using one of two recognized high-class gas and coke producing coals.

These figures in themselves would indicate that the coke produced by the thirty companies was just as satisfactory a grade of coke, and probably more so, as that produced by the seven companies. In short the intrinsic value was just as great or greater and should command at least the same selling price.

Advantages Expressed in Dollars

The crushing and screening outfit which we installed is ample to take care of the preparation of ten thousand tons of coke per annum and was erected at a cost of $1,200. Assuming that the average annual sale of coke of the thirty companies mentioned was 3,000 tons. Assuming further that the installation of a crushing and sizing apparatus would enhance the value of their product to the equivalent of the value of the product received by those companies preparing and sizing their coke, they would have an increase of approximately 40 cents per ton.

Using the figure of 3,000 tons for the average annual sale of coke there would be an increased revenue of $1,200 per year, which represents the maximum figure for the companies in question to make an installation which would efficiently prepare their coke.

Surely any investment that pays for itself in one year could be considered a very profitable one.

Even though the annual sale of coke was only 1,500 tons, the necessary investment could be retired in two years, and a foundation, for a good sound coke business with a representative selling price, would have been laid.

So often the statement is made that it is necessary for the retail price of coke to be based upon the prevailing prices of coal, and that it is not always possible to secure a better selling price for coke regardless of the merit of the product. The Benton Harbor-St. Joseph Company's experience has been that the majority of its customers use coke on account of the desirability of the fuel from the point of view of cleanliness and convenience rather than economy.

Freedom From Oppressive Legislation the Logical Sequence of Public Good-Will

E. L. Hall Asserts Good-Will is Secured by Quality of Service Rendered, by Public-Spirited Attitude Towards Municipal Progress, by Liberal Treatment of Employees, and by General Sympathetic and Progressive Attitude

The failure or success of efficiency methods depends in a great measure upon the general policy of the company, declared E. L. Hall, chief engineer of the Portland (Ore.) Gas & Coke Company, in a paper presented at the recent annual convention of the Pacific Coast Gas Association, held at Santa Barbara, Cal. It may be conceived that the aim of any utility is essentially to make reasonable earnings for the stockholders. Modern conceptions have insisted that such returns will derive their permanence and security chiefly through the good-will of the community served, and freedom from embarrassing legislation.

Such good will is secured principally by the quality of service rendered, by a public-spirited attitude towards municipal progress, by a liberal and humanitarian treatment of employees, and, above all, by a generally sympathetic and progressive attitude.

Freedom from oppressive and embarrassing legislation is a logical sequence of public good will.

As applied to the inner workings of the utility, the foregoing finds application principally in the inculcation of progressive ideas throughout the rank and file of the stockholders, officers, and employees, so that concerted efforts are made possible toward the realization of the aims and purposes of the utility. An understanding of the psychology governing the attitude of employees towards the utility, towards the public, and towards one another, is an essential for the establishment of the right *esprit de corps*. The creation of such a favorable atmosphere is thus the first requisite and step toward the inauguration of efficiency methods.

The essential thought which must permeate the organization is that results cannot be accomplished by individual effort as cheaply and expeditiously as by concerted action.

In a word, team work must replace the natural desire of the individual for direct action. At all cost, the ego must be suppressed. Pride in organization should replace pride in one's self.

Pushing Sales of Electric Ranges Increases Gas-Range Sales

During the last year there has been a whispering discussion as to the effect of the electric range on the gas industry, and a few of our associates have probably become alarmed; as they have many times during our hundred year existence. We are buried, and left for dead, but before the enemy is out of hailing distance we push up through the earth, stronger and more energetic than ever before, and the so-called burial was all imaginary.

The Modesto Gas Company has had a strong electric campaign waged against it in the last few months, and all that we can report is more gas stoves sold than ever before, and the man who had the electric range did not care about waiting for lunch when he expected breakfast.—*Extract from Presidential Address of Frank A. Cressey, Jr., before the Pacific Coast Gas Association.*

News of the Gas Industry

Palo Alto (Cal.) Gas Plant Valuation Fixed at $65,000

The California Railroad Commission has evaluated the property of the Palo Alto Gas Company at $65,000, and steps will be taken immediately by the city to condemn and buy it. Originally the city offered $50,000 for the plant, and the company asked $140,000. It is expected that the Board of Public Works will recommend the purchase at its next meeting and a bond election for the purpose will be held at an early date.

Municipal Waterworks so Bad Gas Company Cannot Sell Automatic Water Heaters

From Crisfield, Md., there comes an assertion that presents a problem in the introduction of gas-fired automatic water heaters that appears beyond remedy insofar as the gas interests are concerned. It is stated that the service furnished by the Municipal Water Works is so bad that the gas company cannot sell automatic water heaters.

Another interesting point is brought forth in that the cost of water—which pours down free from the skies—is higher to the consumer than that of gas, which is distributed from coal which must be bought; the rates being: Water, per 1,000 cu. ft., $3.80; gas, per 1,000 cu. ft., 125.

Actual measurements have disclosed, it is said, that enough water is pumped to net the city $1,100 per month, but because of leaky mains and other reasons, unmentionable in these columns, the net monthly income for the supply amounts to but from $275

Omaha, Neb., Company Builds $3,500-Locker Room as a Measure of Welfare Work

Owing to the fact that the lockers used by its men at the gas works were scattered in different parts of the plant, the Omaha (Neb.) Gas Company found that it was impossible for the men to keep clothes clean in them, and, also, that a fire hazard was present when paper and clothing were left in the bottom of the lockers. It, therefore decided to construct a separate fire-proof building to be used for lockers and wash room. This building is nearly completed at the present time. In size it is 40x27 ft. and will cost nearly $3,500. There will be showers, toilets, and wash basins, to be used by the men engaged at work around the plant. The building is well lighted and can be kept clean quite easily.

The company believes that by having such a building, the men will take more pride in their work, as they then will be able to wear good clothes when they come to work, knowing that they can be kept clean in their lockers, and also they will have a clean place in which to take a shower bath after work.

This building also gives the company a good place to install its bulletin boards, and the men will be apt to read them more carefully here than when distributed in several points around the works. William H. Taylor is manager of the company.

Municipal Gas Plant Raises Industrial Fuel Rate

The price of fuel gas at Bellefontaine, Ohio has been raised from 50 cents to 75 cents per 1,000 cu. ft. effective Oct. 10, but the price of illuminating gas will remain at $1.25. The 10 per cent discount allowed on bills that are paid within the month they become due will make the net price of fuel gas 67½ cents as against the net price of 45 cents at the present. The net price of illuminating gas will remain at $1.12½.

Action raising the price of the fuel gas was taken Sept. 14 by the Board of Control, all of the three members agreeing to the 75 cent price for fuel gas after a long conference on the subject. There had been a proposal for establishing a uniform rate for both the fuel and illuminating gas but this plan was finally abandoned.

For the three years prior to 1907 the city charged 75 cents for fuel gas and $1.25 for illuminating gas. The rates now established are more liberal than then because of the 10 per cent discount that is given on bills which are paid within the month they become due.

Present prices paid for materials entering into manufacture of gas at the city's gas works are so high, it was stated, and the cost of labor has been increased because of the adoption of the eight-hour day, so that the plant has been losing money. Server Inskeep has figured out that the plant ran behind $3,800 in operating expenses alone during the first six months of this year.

Director Inskeep has estimated that the new price will yield $4,600 more for the remainder of this year than the old rate of 50 cents would have produced for the plant.

Figures worked out by the service director for the first six months of the year show the cost of manufacture and distribution of gas to have been 65 cents per thousand feet. Under the new arrangement Server Inskeep estimates that the city will be getting an average price of 82 cents, gross, for the gas it sells for all purposes.

Municipal Gas Plant Suspends Operations

The town board of North Bend, Neb., has decided to close up the municipal gas plant, which has been in operation many years. Extensive repairs are needed at the plant and the board considered it inexpedient to make them.

Baltimore Company Secures Gas Heating Customer Using 1,200 Cu. Ft. Per Hour

The Consolidated Gas, Electric Light & Power Company of Baltimore has on hand a gas heating proposition for a store in which arrangements have been made for the installation of a large Bryant steam boiler equipped for gas operation to supply heat for the entire store. The demand for gas will be 1,200 cu. ft. hourly. A feature of the August business has been the large number of inquiries regarding gas heating for residences, stores and industrial plants.

Troy, N. Y., Gas Company Moves Into New Building

The Troy (N. Y.) Gas Company has moved into its new building—recently completed—on Second Street, just south of Broadway.

The front of the edifice is built of artificial granite with bronze windows and doors and the first story is rusticated with heavy arches over the show windows. The building is built of brick, the floors and roof reinforced with concrete, and is modern in all construction and appointment. The main building has 52 ft. front and is 83 ft. deep. There are four stories and a mezzanine floor. All floors are made of a composition, marble and terrazzo. There is not a wooden floor in the entire structure and all woodwork is of white quartered oak.

The first floor contains the main display room, cashier's room, collectors' room, street and electrical superintendents' offices. The display room is wainscoted to a height of ten feet six inches, with marble set off with monolithic marble columns and pilasters with ornamental capitals. The heavy moulded ceilings and floors of red varigated marble and verde marble insets augment the impressiveness of these chambers. The mezzanine floor is enclosed with ornamental iron railings and the cashier's office with bronze grilles. The ceiling and sidewalls are finished in a rich old ivory color that adds to the substantial appearance of the interior. Each entrance is equipped with a revolving door, which is encased in marble, making a door of this character which is not duplicated in this vicinity.

In planning the construction of the building the company had two things in mind which were faithfully carried out: The convenience of the consumers and the comfort of the employees. This is demonstrated by the manner in which the mezzanine floor is utilized.

Here there is a ladies' waiting room and a display room, smaller than the one down stairs. For the employees there is a

welfare room, a library and shower baths, everything furnished and equipped in the general standard of the structure.

The second floor contains the offices of the general manager, cashier, other officers, stenographer and general accounting room. Lockers, retiring rooms and supplies take up the rest of the space.

The president's office is on the third floor, as well as the meeting place for the board of directors, the drafting room and the offices of the heads of the operating department. The fourth floor is occupied by tenants. The present occupants including two of Troy's most distinguished legal firms.

All corridors, hall rooms, and staircases are wainscoted in marble. These floors differ from the ones in the offices, in that they are made of terrazzo, while the office floors are of composition. The building is equipped with passenger and freight elevators and is lighted in the most approved modern way.

There is a vacuum cleaning attachment on every floor. All windows are metal glazed, with wire plate glass. The rear building, 63 by 35 ft., is but two stories high, and is connected with the main edifice on the first and mezzanine floor. It contains the garage and work shop.

Henry C. Shields is vice-president and general manager of the company.

Reduced Industrial Rate At Gardner, Mass., Will Secure Large Heat Business

A new rate of $1 per thousand cu. ft. has been established by the Gardner (Mass.) Gas Light & Fuel Company for industrial consumers of more than 100,000 cu. ft. per month. A graded scale, based on amounts ranging from 10,000 to 100,000 cu. ft. monthly, calls for rates ranging to a maximum of $1.50.

Formerly the lowest rate for industrial uses in large quantities was $1.45. It is expected that the reduction will be the means of securing a large amount of auxiliary heating business in factories. A number of local manufacturers are contracting for supplies under the new schedule. One important use of gas at Gardner, the great "chair town," is for heating glue pots.

A New Recording Thermometer

The Brown Instrument Company of Philadelphia is placing on the market a new type of recording thermometer for temperatures to 800 deg. Fahr. or 425 deg. Cent. which embraces a number of original features. This instrument operates on the principle of the expansion of gas with change in temperature. A bulb of copper containing nitrogen gas under pressure is connected to a recording instrument by a small copper tube protected by flexible steel tubing.

The recording instrument has a helical spring somewhat similar to that used in pressure gauges, and the expansion of the gas in the bulb exerts pressure which is conveyed by the capillary tube to the helix, which expands proportionately. This helix is directly connected to a recording arm which marks on the record chart.

This type of instrument can be furnished with tubing as long as 100 ft. if required, so that the recording gauge can be placed as much as 100 ft. distant from the point where the temperature is measured. This permits of its application in numerous processes where it is desirable to keep a constant record of the temperature on a chart.

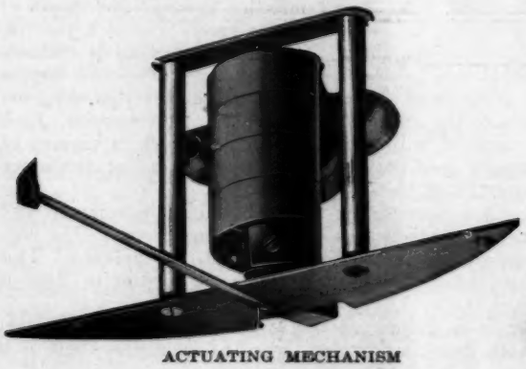
Some of the improved features in this new type of instrument follow:

The Seth Thomas clock which revolves the chart is mounted directly on the front plate on which the chart revolves, thus insuring alignment of the clock and chart plate.

The clips which hold the chart in position are mounted in the door so that when the door is swung aside these clips are automatically swung away from the chart, permitting its easy replacement without interference.

A device is furnished which raises the chart pen from off the chart automatically when the door is opened, and frees the pen automatically when the door is closed.

This instrument is made also in indicating form where desired to indicate the temperature on a dial instead of recording it on a chart. It is furnished with a number of different types of bulbs, either with threaded connection for insertion in mains and pipes, or with lead coating to withstand chemicals and acids.



ACTUATING MECHANISM

DISTANT TYPE INDICATING THERMOMETER

Want Sliding Scale in Increase Consumption at Chicago Heights, Ill.

An effort is being made to adjust gas rates at Chicago Heights, Ill., to meet modern conditions, and to obtain for the company additional customers and thus more adequately distribute the burden of supplying the city with gas.

At a recent conference held to discuss the matter, at which Henry I. Lea, consulting gas engineer, of Chicago, was present, H. E. Gunn, vice-president of the Manufacturers Association, stated that the Manufacturers Association was interested in getting as low rates of living for its members and employees as was enjoyed in other places in the state, and, as both Moline and Blue Island had a lower gas rate than Chicago Heights, they wanted to know if that city could not be put on an equality with the towns named in the matter of gas. Charles H. Wacker, president of the gas company stated that the company had 41 miles of mains and was serving approximately 1,775,000 ft. of gas per mile, while in many places the service per mile ran up to 4,000,000 ft. and some plants delivered up to 14,000,000 ft. The rate proposition Mr. Wacker said, is an absolutely local matter, and must be so treated.

The gas company has the right to charge a minimum of 60 cents per month, of which it has never availed itself, and many of its customers are not paying even 50 cents per month. He declared that the interests of the gas company, manufacturers of the people generally were akin, and that it was not the time to ask for a reduction in rates when nearly everything that entered into the cost of gas production had advanced, some of the articles as much as 200 per cent.

He resented the thought that there ever had been any unfair dealing on the part of the gas company toward the city, and regretted that, under the law, the company could not make special rates to large consumers and thus supply many of the manufacturers.

Mr. Lea analyzed the economical situation with regard to the production of gas. He declared that the consumers should be put on an equal basis, and that a gas company should get rid of non-paying consumers, and all users of its products pay their pro rata share of the cost. He showed that a customer who used 94 ft. of gas per

STATEN ISLAND BUSINESS MEN WHO GATHERED ON HIGHEST POINT ON ATLANTIC COAST TO EXPRESS APPRECIATION OF EFFORTS MADE BY GAS MAN TO RENDER THEIR COMMUNITY A SATISFACTORY SERVICE—AMONG THOSE IN GROUP ARE (1) W. J. WELSH, (2) BEAMAN G. DAWES, (3) G. F. GOODNOW, (4) WILLIAM McCLEARY, (5) C. H. WADELTON, OF THE AMERICAN GAS LIGHT JOURNAL, AND (6) CORNELIUS KOLFF

hour in Chicago Heights, with the present investment on the part of the company should pay a fixed charge of $2.10 per month before he received any gas, and that, after that payment, gas could be served him at 48 cents a thousand cubic feet. It was impracticable, however, to make people understand this fixed rate and in order to achieve the results the most modern scheme is to divide the consumers into groups, and to give the consumer who is served at the least expense to the company the lowest rate and to the consumer who is served at the greatest expense the highest rate.

This equalizes the load, and allows the company to secure its fixed charges, and would work out satisfactorily all around.

Mr. Lea stated this system had just been installed in St. Louis, and was akin to the system of the Commonwealth-Edison company, which has proved very successful.

As a result of the conference, the gas question will be considered in the light of the facts submitted, and the company will make an appeal to the Council to permit it to adopt measures that will work equity all around. If the Council is brought into accord with the views of the company officials, the public utilities commission will be asked to readjust rates in the Chicago Heights.

Terre Haute By-Product Coke Plant Put Into Operation

The new $1,000,000-plant of the Indiana Coke & Gas Company was placed in operation Sept. 26. Thirty coke ovens were charged for the first time.

The by-products will include tar, ammonia, gas, benzol and naphthalene. A. M. Ogle, head of the Vandalia Coal Company, is president of the corporation; Paul N. Bogart, vice-president, and T. L. Kemp, general manager. About 125 men will be employed.

The coke output is estimated at from 125,000 to 150,000 tons a year and 600 tons of coal will be used daily in its manufacture. This will come from mines in Vigo, Sullivan and Greene counties.

The company has made a contract with the Citizens Gas & Fuel Company to supply gas for its patrons.

Bath (N. Y.) Company Increases Gas Consumption by Pushing Heater Sales

"During the Fall and Spring of the past two years, our commercial departments, under the direction of J. H. Maguire, has had a wonderful success in increasing our consumption by pushing the sale of No. 4 Reznor Reflector Heaters," states Frank Nollett, president of the Bath Electric Gas Light Company, of Bath, N. Y. During the past week it was necessary to order an express shipment in addition to the usual freight consignment, which was on the rails, to keep pace with the sales. The heaters are sold at a normal price plus the cost of connecting, and with a guarantee of satisfaction or return of the money after a month's trial.

Staten Islanders Give Appreciation Outing to William J. Welsh

For the purpose of showing their appreciation of the efforts of William J. Welsh to give the Island a satisfactory gas service, and to become acquainted with officials of the Dawes Syndicate, the new owners of the company, Cornelius Kolff and the Staten Island Chamber of Commerce, gave an outing at the Log Cabin on Emerson Hill (said to be the highest point on the Atlantic Coast from Maine to Florida), Stapleton, S. I., on Sept. 28.

Mr. Kolff was the official spokesman for the business people, and introduced the several speakers—the Messrs. Cole, of the syndicate, Durkee, Kane, Rev. Mr. Cassidy and Senator Bayne—who voiced the sentiments of the Board in expressing in pleasing terms the high regard and esteem in which Mr. Welsh is held, and told of the numerous things he has accomplished in giving the company's patrons the service and attention they required. The fifty friends present heartily applauded Mr. Welsh when he arose to reply.

All lines of business on the Island were represented at the gathering. Among the gas men present were Beaman G. Dawes, representing the syndicate, G. F. Goodnow, chief engineer of the Dawes Syndicate, and William McCleary, superintendent of the New York & Richmond Gas Company.

The Dawes Syndicate, as has been mentioned previously in this journal, bought the holdings of Messrs. F. H. Shelton, R. L. Forrest and M. M. Freeman in the New York & Richmond Company some time ago, and, while it is not known yet as to just what the new controlling interest's intentions are, it is understood that there will be some large high pressure extensions, and the service will be greatly increased.

Mr. Welsh will continue as president and general manager of the company.

Societies and Associations

THE SOUTHERN GAS PRODUCERS' ASSOCIATION has set May 9, 10 and 11 as the dates for its next year's meeting, which will be held at Roanoke, Va. The convention met last in Tampa, and after trying several times Roanoke succeeded in securing the next meeting which will be one of the largest in the association's history.

THE MANAGERS AND OPERATORS OF THE DOHERTY GAS PROPERTIES will convene in New York City, Nov. 13-14, prior to the annual convention of the National Commercial Gas Association. It is expected that about 70 members of the organization will attend the meetings. The following program has been prepared:

ARE THE INDUSTRIAL FUEL POSSIBILITIES BEING REALIZED? by H. O. LOEBELL, head of the Industrial Fuel Department.

A Review of the Industrial Fuel Campaign in Knoxville, Tenn., by F. M. Rosenkrans and J. F. Trexler, members Industrial Fuel squad.

Experiences in Obtaining Restaurant and Hotel Business, by F. H. Maloney.

Some of the Functions of the Manager of a Gas Company, by M. R. Bump, chief engineer of Henry L. Doherty & Co.

Merchandising of Natural Gas and Some of its Problems, by C. J. Wright.

Experiences in Using Gas in Power Operation, by A. W. Morgan and J. W. Griswold, members Industrial Fuel squad.

Your Company's Place in the Community, by George Williams, manager New Business Department.

Readjustment of Rate Schedules to New Industrial Demands, by R. S. Griswold, chief technologist.

Effect of Securing Big Industrial Business On, A: Coke Output, B: Distribution Systems and Holder, C: Plant Equipment, by F. C. Weber, gas and district engineer.

Coke Sales, Methods and Policies, by F. A. Woodworth.

Discussion on Competition Offered By Electric Cooking and Heating.

Personal Notes

J. F. Seaman, for many years connected with the United Gas Improvement Company of Philadelphia, died Oct. 3, after an illness of two years. Mr. Seaman established an enviable record for himself as a gas engineer.

O. P. Byars, formerly of the Rome Municipal Gas Company, of Rome, Ga., has been appointed new business manager of the Fayetteville Light & Power Company of Fayetteville, N. C.

William B. Voth, for two years engineer with the Empire United Railways of Syracuse, has been appointed head of the Ogdensburg Power & Light Company, Ogdensburg Street Railway and the Ogdensburg Gas Company, the concerns recently purchased by the Aluminum Company of America.

Albert Arneson has resigned from the Appleton Manufacturing Company of Batavia, Ill., and has accepted a position with the Western United Gas & Electric Company.

John W. Smith, for several years superintendent of the Clinton Gas & Electric Company, and for twenty-six years employed in that plant, has been appointed superintendent of the McKinley utilities located at Chenoa, El Paso, Gridley, Meadows, Hudson, Lexington and Towanda, with headquarters at Chenoa, Ill.

E. H. Gray, formerly superintendent of the McKinley utilities with headquarters at Chenoa, has been appointed superintendent of the utilities at Jacksonville.

Robert E. Freel, manager of the Clinton, Mass., Gas Light Company, was in attendance at the conference of the managers and salesmen of the gas light companies of New England, held recently at Northampton.

Construction Notes

Utility Commission Orders Improved Machinery Installed at Rome, Ga., Plant

The Georgia Railroad Commission has ordered improved machinery installed in the plant of the Rome Municipal Gas Company, and will insist that the product of the company contain additional heat units. The case is the first of its nature to come before the Georgia commission, and will serve as a precedent in handling other public utility cases. Complaint was made to the commission by Seaborn Wright, representing citizens of Rome, that the service and product were unsatisfactory. An investigation has been in progress for several weeks, and the order of the commission requires weekly tests of pressure and heat units to be made by officers of the company, and report made under oath to the commission.

New Gas Plant to be Built at York, Neb.

The Public Service Corporation, successors to the York Gas & Electric company will soon begin the erection of a new plant at York. Total expenditures will exceed $70,000, of which $20,000 will be expended on the building, and $50,000 in new machinery.

Sausalito, Cal.—Articles of incorporation have been filed with the Sausalito Gas Company. It is incorporated with a capital of $100,000 to build an electric light and gas plant. J. E. Bell of San Jose is president of the company. When the plant is constructed it will be taken over by the municipality.

Ansonia, Conn.—The Derby Gas Company is laying a temporary gas main which will be carried across the Naugatuck river. Another temporary main will be carried across the same river underneath the temporary bridge.

W. Palm Beach, Fla.—The Florida Utilities Gas Company has commenced laying additional gas mains in West Palm Beach and Palm Beach. The demand for gas has almost swamped the company and it is receiving almost daily inquiries as to when the extensions will be made to the present mains. The service will be extended to Jefferson Park, King's Court and Carlberg Court on the south and as far as Fifth Avenue on the north. The gas company is also planning to lay about five miles of mains at Palm Beach. This will necessitate an enlargement of the plant and an additional tank with 25,000 cu. ft. capacity will be erected in the near future.

Murphysboro, Ill.—L. W. Peters has been awarded the contract for the construction of the new steel gas plant which is to supply gas for Carbondale and Williamson. The bid was $11,456.

Braintree, Mass.—The gas main on Hayward Street of this city is being extended westerly from Howard Street.

Lynn, Mass.—The Lynn Gas & Electric Company is enlarging its supply pipe on Eastern Avenue for a distance of several hundred yards.

Methuen, Mass.—The selectmen has granted permission to the gas company to extend service in Elm Street and in other streets.

Worcester, Mass.—Delay in receiving pipe is holding back the construction of important gas service extensions here. There are said to be 2,000 householders who are waiting for connections. Of 30,000 ft. of pipe ordered in December only 12,000 ft. have arrived thus far, the gas company reports.

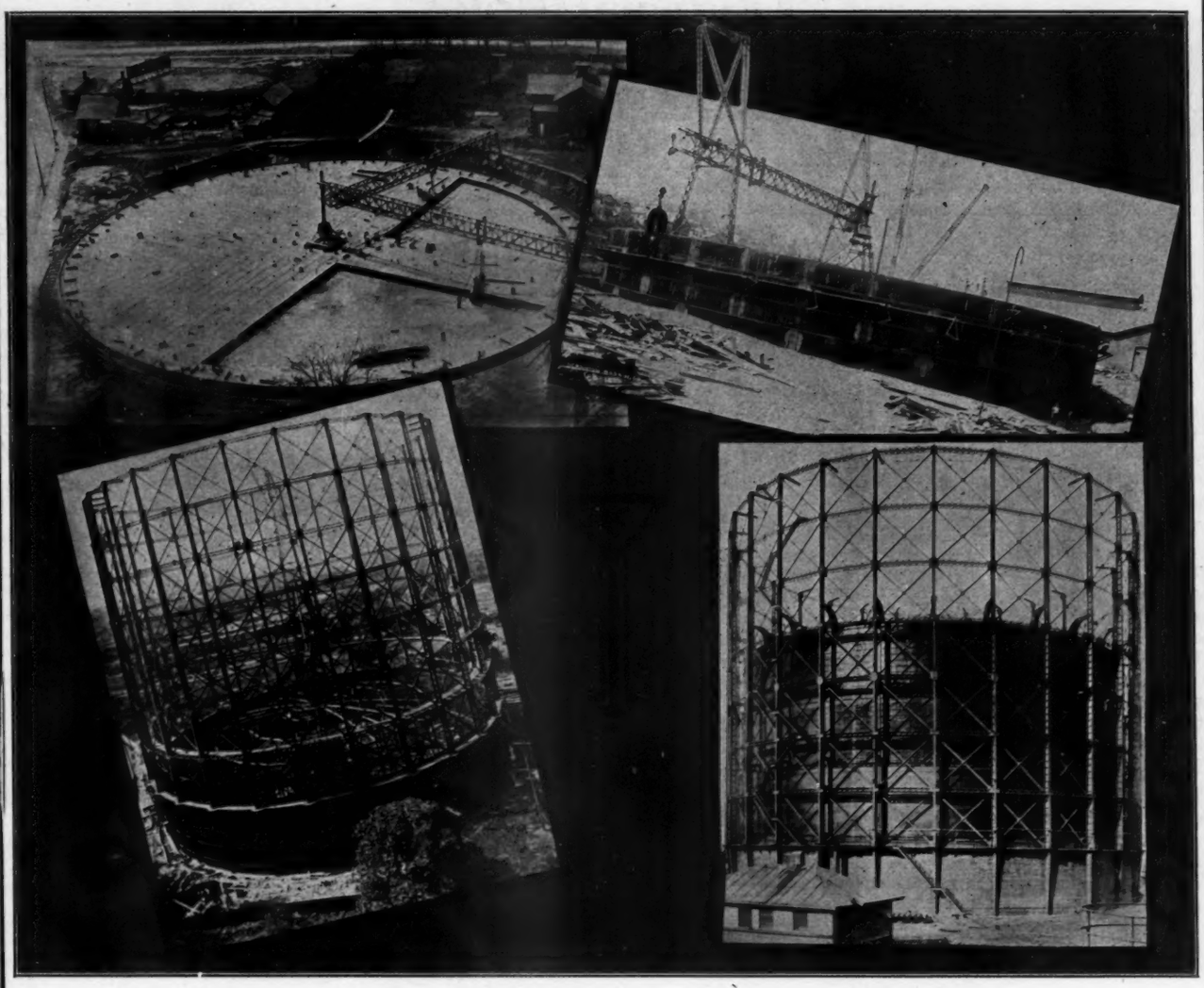
Passaic, N. J.—Permission has been granted the Public Service Company to extend its mains in Prospect Street, Leo Place, Saint Joseph's Boulevard and Division Street.

Paterson, N. J.—The Public Service Gas Corporation has been granted an extension of time to install new gas mains on East Fifth Street, between Warren and Lyon Streets.

Rome, N. Y.—Work has been rushed on the new gas plant being erected by the Rome Gas, Electric Light & Power Company in East Rome, just west of Mill Street. The gas holder under construction will have a capacity of 300,000 cu. ft., and will be finished some time next month. The foundation for the retort building is at present under construction and it is expected the work on the walls will be started in a short time. It is expected that the entire plant will be completed and ready for operation in 1917.

Cincinnati, Ohio.—The Ohio Gas and Electric Company has been authorized by the State Public Utilities commission to issue $59,000 in stocks and bonds to purchase the Medina Electric Light and Power Company and at the same time to issue $130,000 worth of bonds with the proceeds of which to construct a pipe line from Cincinnati to Middletown.

West Toledo, Ohio.—Citizens are agitating for extension of gas mains and they state only one gas main penetrates West Toledo and the supply is not sufficient for the demands.



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Financial Notes.

WESTERN CANADA PUBLIC UTILITIES, LTD., holders of 6 per cent 3-year collateral gold notes have been notified that property will be sold Oct. 17, at public auction. This action is sequel to default in interest on notes Sept., 1915.

THE MASSACHUSETTS GAS COMPANIES report the following earnings for August, with comparisons:

	1916	1915	1914
Boston	$67,908	73,847	64,643
Quincy	4,212	6,705	5,516
East Boston	4,131	5,673	*1,988
Newton	2,820	2,675	1,674
Totals	79,071	88,902	69,846

*Deficit.

THE MILWAUKEE GAS LIGHT COMPANY, for the year ended June 30, 1916, reports a surplus after depreciation reserve, $1,080,561, of more than 20% on the $5,000,000 stock. All the stock in The Milwaukee Gas Light Company is owned by the Western Gas Company, the stock of which, in turn, is owned by American Light & Traction Company.

THE EMPIRE GAS & FUEL COMPANY and subsidiaries have just given out a combined statement for the twelve months ending July 31, 1916, as follows: Gross earnings, $6,744,591.08; operating expenses and taxes $2,789,501.33; net profits, $3,955,089.75; less minority ownership, $318,171.51; net balance, $3,636,792.24; one year's interest on $14,000,000 first and collateral 6s, $840,000.

For the three months ending July 31, 1916: Gross earnings, $2,526,733.13; operating expenses and taxes, etc., $962,256.59; net profits, $1,564,476.54; less minority ownership, $67,936.22; net earnings accruing to Empire Gas & Fuel Company, $1,496,540.32; less interest on $14,000,000 first and collateral 6s, $210,000; balance, $1,286,540.32.

THE COLUMBIA GAS & ELECTRIC COMPANY, according to the monthly financial statement just issued, shows material increases in gross and net earnings for August, as compared with August of last year.

The statement of consolidated earnings and expenses for August, is as follows:

	August, 1916.	Increase.	Increase, Pct.
Gross earnings	$ 584,586.51	$ 69,412.37	13.4
Operating expenses	320,971.63	25,584.14	8.6
Net operating earnings	263,794.88	43,828.23	19.9
Other income	51,821.57	3,731.71	7.2
Total net earnings and other inc	315,616.45	47,559.94	17.7
Lease, rents, &c	284,552.05	4,432.50	1.5
Fixed charges—			
Col. G. & E. Co	58,156.51	187.71	
Surplus	*27,092.11	42,939.73	61.3

For the eight months ended August, 1916, the statement shows:

	August, 1916.	Increase.	Pct.
Gross earnings	$5,901,896.46	$552,485.98	10.3
Operating expenses	2,877,290.34	189,962.48	7.0
Net operating earnings	3,024,606.12	362,523.50	13.6
Other income	347,851.11	21,425.01	6.1
Total net earnings and other inc	3,372,457.23	383,948.51	12.8
Lease, rents, &c	2,257,142.75	15,095.18	
Fixed charges—			
Col. G. & E. Co	462,384.59	4,780.30	1.0
Surplus	652,929.89	364,073.03	126.0

*Deficit.

THE MASSACHUSETTS LIGHTING COMPANIES report aggregate net sales for August, 1916, of $110,490, compared with $95,355 for August, 1915, an increase of $15,134, or 15.9 per cent, and for the two months ending Aug. 31, $211,483, compared with $184,173, the same period last year, an increase of $27,310, or 14.8 per cent.

The Milford Electric Light & Power Company and the Milford Gas Company are included in these properties.

THE CONSOLIDATED GAS, ELECTRIC LIGHT & POWER COMPANY rights have been admitted to dealings in the N. Y. Stock Exchange.

THE CONSUMERS POWER COMPANY OF MICHIGAN, reports gross earnings for August amounting to $367,353, increase 19 per cent; net $197,656, increase 0.41 per cent; balance after charges and preferred dividends, $61,770, decrease 10.3 per cent. Twelve months' gross, $4,458,173, increase 22 per cent; net $2,829,181, increase 17 per cent; balance after preferred dividends, $1,168,440, increase 33.1 per cent.

THE COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY reports gross earnings for August amounting to $1,358,867, increase 11 per cent; net $667,860, increase 10 per cent; surplus after charges, $174,133, increase 8 per cent. Twelve months' gross, $16,152,529, increase 14 per cent; balance after preferred dividends, $1,611,074, increase 31 per cent, and equivalent to 8.74 per cent on common stock.

Current Prices of Public Utility Securities

	Bid	Asked
Adirondack Elec. P	27	29
Adirondack Elec. P. pf	83	85
American Gas	120	123
*American Gas & Electric	153	157
*American Gas & Electric pf	50	52
American Light & Traction	386	390
American Light & Traction pf	111	113
American Power & Light	70	71
American Power & Light pf	83	85
American Public Utilities	40	45
American Public Utilities pf	72	75
American Water W. & Elec	8	8¾
Amer. W. W. & E. 1st pf	63	67
Amer. W. W. & E. part'p pf	24	26
Carolina Pow. & Lt	27	30
Carolina Pow. & Lt. pf	97	100
Cities Service	336	339
Cities Service pf	90	91
Colorado Power	27½	29
Colorado Power pf	99	101½
Commonwealth, Pr. Ry. & Lt	60	64
Commonwealth, Pr. Ry. & Lt. pf	83½	85½
Denver Gas & Electric gen. 5s	96	98
Electric Bond & Share pf	99½	100
Empire District El. pf	88½	92½
Federal Light & Traction	15	17
Federal Light & Traction pf	50	54
Gas & Electric Securities	280	300
Gas & Electric Securities pf	95	100
Northern States Power	98	99
Northern States Power pf	96	99
North. Ont. Lt. & P	14	17
North. Ont. Lt. & P. pf	55	60
Ozark Power & Water	44	48
Pacific Gas & Electric	57½	58
Pacific Gas & Electric pf	90	92
Republic Ry. & Light Co	48½	49½
Republic Ry. & Light Co. pf	74	77
*Standard Gas & Electric	14½	15½
*Standard Gas & Electric pf	41¼	42
So. Cal. Edison	92	93
So. Cal. Edison pf	106	108
Tennessee Ry., Light & Power	11½	12½
Tennessee Ry., Light & Power pf	52	54
Toledo Trac., Light & Power	52	—
Toledo Trac., Light & Power pf	89	—
United Light & Railways	49	51
United Light & Railways 1st pf	74½	76½
Western Power	19½	20½
Western Power pf	69	70

*Par value $50